NETWORK WORLD
THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING
AN INTERNATIONAL DATA GROUP PUBLICATION ◆ VOLUME 10, NUMBER 37 ◆ SEPTEMBER 13, 1993

HP readies flagship product for big push into work flow arena

BY BOB BROWN

Fort Collins, Colo.

Hewlett-Packard Co. is readying a cross-platform work flow management system that will be the centerpiece of its plan to capture a big chunk of this fast-growing network application market.

The firm's work flow engine, which has yet to be named or priced, will aid users in building work flow applications, defining and automating work flow procedures, and managing other functions such as document distribution and database access, said Mike Apker, marketing manager for HP's Work Management Operation here.

The engine will support a variety of work flow applications, including ad hoc applications for project management, and production systems such as a loan processing application, he said.

The product is being developed by HP's recently formed Work Management Operation. That group will offer the work flow engine to other organizations within HP, as well as to external OEM partners for embedding in products that can take advantage of work flow capabilities.

HP's software will run on client systems under HP, IBM, Microsoft Corp. and Sun Microsystems, Inc. operating systems and on HP, IBM and Sun server platforms. The software will work with databases from HP, Informix Software, Inc., Ingres, Oracle Corp. and Sybase, Inc.

Users will have a choice of transports that include electronic mail systems, such as HP OpenMail, and various network pipes, such as those supporting Transmission Control Protocol/ Internet Protocol.

The work flow engine is being used at three beta sites in Europe — including a bank and a railroad — and is scheduled to become generally available worldwide next spring.

HP's disclosures come on the heels of news from IBM that it is

See HP, *page 89*

SynOptics set to unveil high-end 'hub of hubs'

LattisNet System 5000 to play key switch role.

BY SKIP MacASKILL

Santa Clara, Calif.

SynOptics Communications, Inc. later this month will roll out its next-generation hub, which will be positioned as a centralized switch for collapsed backbone architectures — a move likely to result in a protracted turf battle between switch and router vendors.

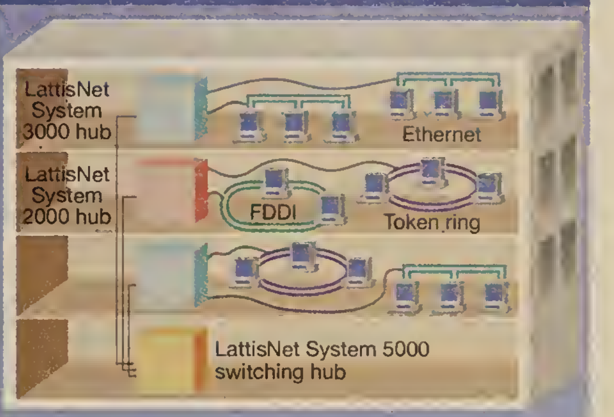
The LattisNet System 5000 will be based on a frame switching architecture and come equipped with multiple backplanes supporting a combination of Ethernet, token-ring and Fiber Distributed Data Interface local-area networks, according to sources.

The overall backplane capacity will be around 2G bit/sec, and the device is expected to offer connectivity to as many as 50 LANs. An Asynchronous Transfer Mode (ATM) switching fabric will be added in a future release.

"The 5000 will look similar to [Optical Data Systems, Inc.'s] Infinity hub with those multiple backplanes and switching capabilities," said one source. "Like the Infinity, the 5000 will

See SynOptics, *page 90*

SynOptics: The Next Generation


LattisNet System 3000 hub
Ethernet
LattisNet System 2000 hub
FDDI
Token ring
LattisNet System 5000 switching hub

SynOptics Communications, Inc.'s 5000 switching hub will obviate the need to use a bridge/router in an inverted backbone network by utilizing frame switching technology to move traffic among department hubs.

GRAPHIC BY SUSAN SLATER SOURCE: *NETWORK WORLD*

Novell broadens its horizons

New software offers wealth of remote LAN access options.

BY DAVID STROM

San Francisco

Novell, Inc. last week unveiled NetWare Connect, a new generation of communications software that consolidates an unprecedented variety of remote LAN access functions.

While many competitive offerings provide partial remote local-area network access capabilities, no single product currently offers the combination — and the scalability — of communications services offered in NetWare Connect.

ANALYSIS

NetWare Connect 1.0 enables DOS, Windows and Apple Computer, Inc. Macintosh users to dial in and out of NetWare networks using a single product. Up to now, NetWare users had to count on two Novell products — NetWare Access Server and NetWare Asynchronous Communications Server (ACS) — for dial-in and dial-out capabilities.

And neither of these products supported Macintosh clients.

NetWare Connect consists of a set of NetWare

See Novell, *page 14*

LAN leader looks beyond NetWare for future success.

Second in a two-part series.

BY CARYN GILLOOLY

Provo, Utah

If Novell, Inc. gets its way, people will not think of it as simply "The NetWare Company" for much longer.

NetWare has always been Novell's core business, but the company has begun to shift its focus, putting less emphasis on NetWare and expanding its horizons to other areas, such as internetworking, Unix and application development products that will make NetWare more viable on an enterprisewide level.

REKHI

Consider the company's recent restructuring.

Late last month, Novell announced the formation of three distinct business units — the NetWare Systems Group, the UnixWare Systems Group and the AppWare Systems Group — a clear indication that NetWare is only one of the company's focus points for the future.

Novell's NetWare Systems Group, naturally, will play an instrumental role. Besides NetWare, the group includes Novell's internetworking, management, remote connectivity and messaging

See NetWare, *page 89*

NEWSPAPER
100

FRACTIONAL T-3

AT&T kicks up the speed

BY BOB WALLACE

Basking Ridge, N.J.

AT&T last week announced Accunet T32, a 32M bit/sec fractional T-3 service that may be an economical alternative for companies with nine to 15 T-1s or users that aren't utilizing all the capacity of existing T-3 links.

T32 plugs the gap between AT&T's lower speed fractional T-3 services — which were unveiled in November and operate at 4.6M, 6.2M, 7.7M and 10.8M bit/sec — and its 45M bit/sec T-3 service. T32 will be generally available through 273 points of presence by year end, AT&T said.

"We've had quite a few T-1 customers that don't need a full T-3. What they do want is less bandwidth than a T-3 at

See Accunet, *page 89*

Start-up eyes client/server dynasty

BY BOB BROWN

Kingwood, Texas

Start-up Dynasty Technologies, Inc. has quietly begun selling a set of object-oriented development tools designed to let users build client/server applications that can be distributed across enterprise networks.

The Dynasty Development Environment, which is being used at about 10 companies so far, enables developers to build applications and later target them to specific network and computer platforms. That allows application development to move ahead regardless of whether the organization has decided, for example, to use an Oracle Corp. or a Sybase, Inc. database — or a mix of systems. And because the software is object-based, applications can be regenerated for changing environments without rewriting.

"Our software allows you to hedge your technology bet," said Charles Skamser, Dynasty's vice president of business development. "In a single

See Dynasty, *page 90*

Briefs

Intel, MCI partner on PC project. Intel Corp. and MCI Communications Corp. last week signed an agreement whereby they will jointly develop new products that integrate personal computers and telephones. Under the agreement, which Intel said is its first with an interexchange carrier, the two will develop an add-on PC board that will enable users to simultaneously transmit voice, data and video traffic. MCI said it may announce additional products resulting from the arrangement by year end but would not elaborate.

Steering a course to a new IP. The Internet Engineering Steering Group (IESG), the technical committee responsible for choosing the next-generation Internet Protocol, last week laid out the steps it would take to reach that goal. The IESG will establish a temporary division, to be codirected by Allison Mankin, IESG transport services area director, and Scott Bradner, operational requirements area director. Mankin and Bradner will form a preliminary review body that will hold open meetings to decide whether the new IP should be limited to solving the address exhaustion problems of the current IP, or whether it should also include advanced features such as resource reservation for real-time traffic.

MCI gives you more time. MCI Communications Corp. last week announced a complementary new service called Transition Manager that lets users take as long as two weeks to cut over all traffic to a single 800 number, such as a vanity number, rather than flash-cutting traffic as in the past. MCI will also offer standard, predesigned transition plans or will help users customize their own.

Tell us what you want. AT&T is distributing surveys to several hundred members of its AT&T Accunet/InterSpan User Group asking for feedback on its planned Asynchronous Transfer Mode service, which is due out to the masses in the second half of next year. To receive the survey, call Tom Noone, AT&T's product line marketing manager for InterSpan Services, at (908) 658-2860.

Say a few syllables. AT&T last week extended two network-based voice response features to its international 800 service. The features, 800 Speech Recognition and Call Prompter, will enable customers dialing U.S. businesses from 62 countries to use either spoken commands or keypad entries to respond to call routing queries, thus extending voice response applications to users with rotary phones.

A speedier ARTIC. IBM last week announced a 32-bit communications coprocessor adapter card for Micro Channel-compatible systems, such as IBM Personal System/2 and RISC System/6000 servers, that performs up to six times faster than its existing 16-bit version. The ARTIC960, which is intended to support high-speed Integrated Services Digital Network and Asynchronous Transfer Mode services, will be available at the end of October for $2,200.

Bachman to buy Cooperative Solutions. Bachman Information Systems, Inc., a Burlington, Mass., vendor of database design and reengineering software, last week announced plans to buy Cooperative Solutions, Inc., a San Jose, Calif., vendor of client/server application development software.

Pieper assumes UB reins. Tandem Computers, Inc. last week named Roel Pieper president and chief executive officer of its Ungermann-Bass, Inc. subsidiary, replacing Ralph Ungermann. Pieper, 37, who was also named senior vice president of Tandem, was president and CEO of Unix System Laboratories, Inc. (USL) until USL was acquired by Novell, Inc. last June. After the acquisition was completed, Pieper was named executive vice president of Novell.

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Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Susan Collins at (800) 622-1108, via fax at (508) 820-3467 or via the Internet at scollins@world.std.com.

Can you tell me which vendors have PCMCIA token-ring cards available and what I should look for when evaluating the different cards?

Ray Seguna, Sydney, Australia

Andrew Prophet, founder of AP Research, a Cupertino, Calif.-based market research and consulting firm, replies:

There are a number of suppliers of Personal Computer Memory Card International Association (PCMCIA) cards that conform to the IEEE 802.5 standard and IBM's local-area network technology of token passing access, including C Centennial, IBM Networking Systems and Magic RAM, with other vendors expected to announce products in the next six months. These cards all conform to the PCMCIA Release 2.0 standard and will either be Type 1 or 2, depending on the particular card. The difference between the two types is the thickness of the cards and the applications for which they are used. Prices of the cards range from $280 to $350.

For product information, you can call C Centennial at (508) 670-0646; IBM Networking Systems at (800) 643-7409; and Magic RAM at (213) 413-9999.

When shopping for a PCMCIA card, the features you need to evaluate are the same as for any adapter card — namely, speed, connectivity and flexible software. In addition, make sure the card you choose will work on your host platforms. Many of today's PCMCIA cards don't work well across different platforms, so make sure you have interoperability.

Our company's sales force dials in to our Novell, Inc. NetWare 3.11 local-area network using remote laptops. When remote users log off, our Norton Anti-Virus software does not allow the network drivers to be unloaded, causing the laptops to occasionally lock up. We then have to do a cold boot to free up the ran-

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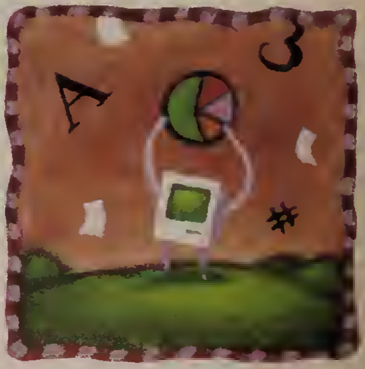

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Vendors reposition EIS tools as market shifts

Four leading vendors to announce new products.

BY WAYNE ECKERSON

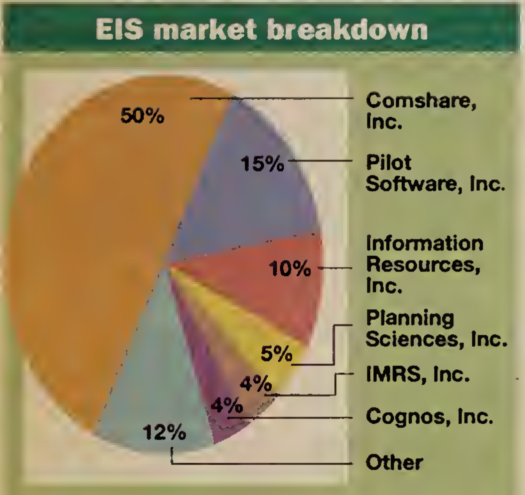
Boston

Times are changing for vendors of executive information systems (EIS).

Several years ago, EISs were highly customized, host-based applications developed for top executives who wanted quick access to summary information about corporate performance.

Today, companies are eager to deploy EIS applications for managers at all levels to access, manipulate and analyze operational data. EIS applications need to run on everything from laptops to local-area networks and hook into databases across an enterprise.

To adapt, EIS vendors are downsizing their products and beefing up connectivity options for grabbing data from SQL and host databases across internetworks. In addition, EIS vendors, squeezed by suppliers of query and reporting tools that provide low-end EIS capabilities, are offering sophisticated decision support applications built atop their core EIS technologies.



EIS market breakdown

Figures are based on 1991 revenues for executive information systems (EIS).

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.
GRAPHIC BY ANNE GIANCOLA

The top four EIS vendors — Comshare, Inc., Pilot Software, Inc., Information Resources, Inc. (IRI) and Planning Sciences, Inc. — this week will unveil new products at an EIS conference here that are aimed at enhancing their positions in this shifting market.

"The game has changed. [EIS vendors] can no longer grow by selling basic tools that run on the mainframe. They need to sell higher end decision support applications," said John Rymer, vice president at Patricia Seybold Group, Inc., an information technology consulting firm in Boston.

APPLICATIONS HO!

Ironically, one of the last EIS vendors to revamp its product line to reflect changing trends is Comshare, which has a 50% share of the EIS market. Comshare will unveil a client/server version of its host-based Commander EIS as well as an application for analyzing corporate profits that incorporates its core EIS technology.

"Comshare's attention to the LAN is overdue, but it's a positive step," said Howard Dresner, program director of the Office Information Service at Gartner Group, Inc. in Stamford, Conn.

The client/server version of Commander EIS, called Commander EIS LAN, runs on OS/2 servers and Windows clients. Future support is planned for Windows NT servers. The product provides connectivity to a variety of data sources, including spreadsheets, relational databases and host data via access software from Q+E Software, Inc.

In announcing the Commander EIS LAN, Comshare officials downplayed the company's EIS tools, emphasizing instead its commitment to providing specific, high-level decision support applications for analyzing corporate data.

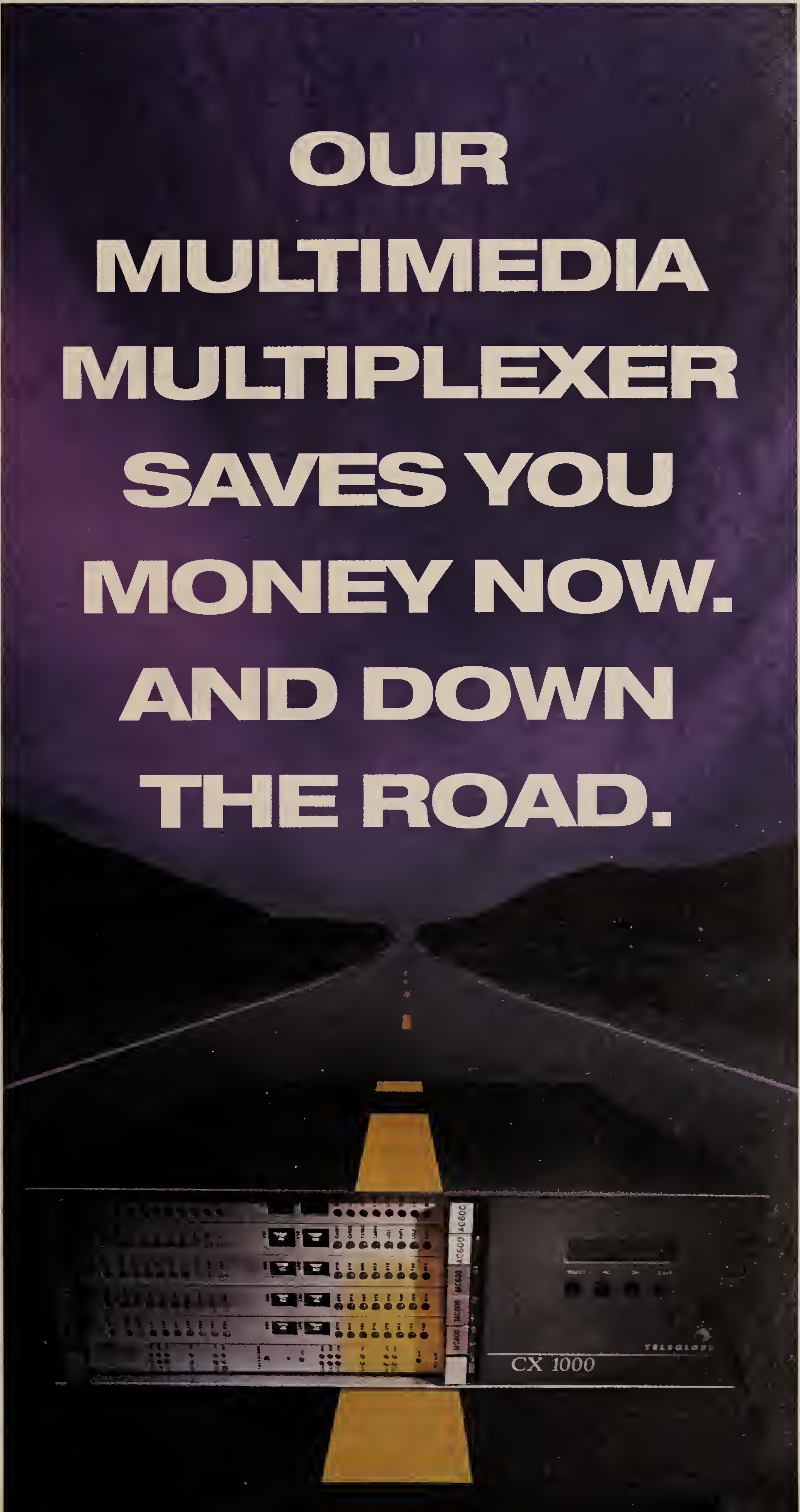
"We've repositioned Comshare from a provider of EIS tools to a provider of business intelligence applications," said Brian Hartlen, director of product marketing at Comshare in Ann Arbor, Mich.

To that end, Comshare unveiled Comshare Commander Profit, a Windows-based application that lets users analyze an organization's profitability based on information the software collects from general ledgers, sales databases and other data sources.

Commander Profit uses Comshare EIS technology to collect and reformat enterprise data, which is placed in a proprietary, multidimensional database, where it can be manipulated using Commander Profit's client software.

In contrast to Comshare, IRI has not given up on the EIS market, even though most of its 30% annual growth has been fueled by the pur-

See EIS tools, *page 8*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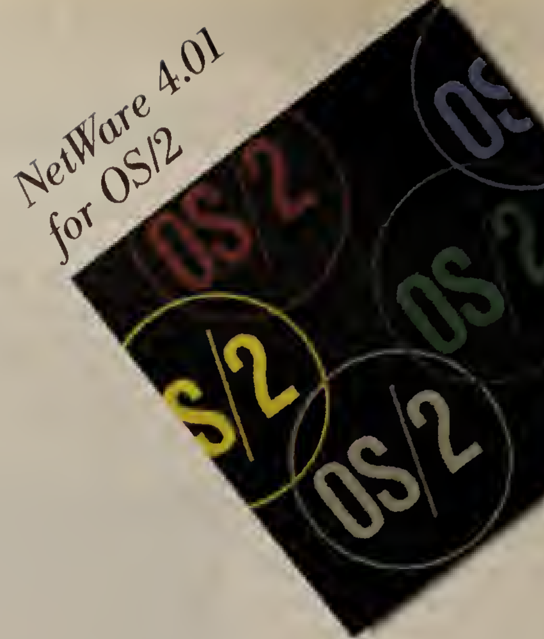

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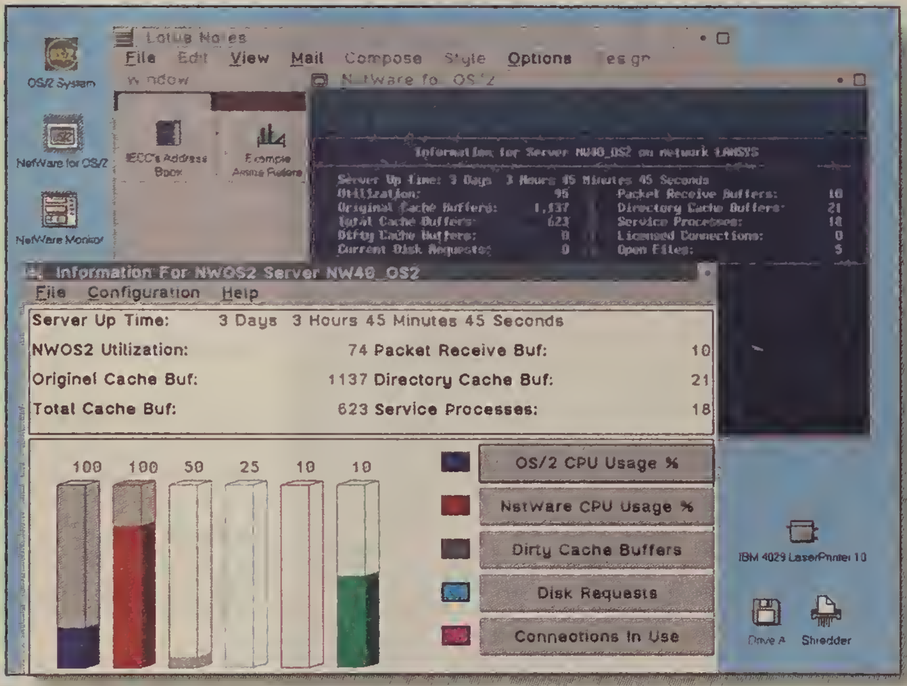

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Information for Server NW40_OS2 on network LANSYS

Server Up Time: 3 Days  3 Hours 45 Minutes 45 Seconds
Utilization:              95    Packet Receive Buffers:      10
Original Cache Buffers:  1,137  Directory Cache Buffers:     21
Total Cache Buffers:      623   Service Processes:           18
Dirty Cache Buffers:       0    Licensed Connections:         0
Current Disk Requests:     0    Open Files:                   5
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Server Up Time: 3 Days 3 Hours 45 Minutes 45 Seconds
NWOS2 Utilization: 74 Packet Receive Buf: 10
Originel Cache Buf: 1137 Directory Cache Buf: 21
Total Cache Buf: 623 Service Processes: 18

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Ascom Timeplex to offer line of ATM switches

BY MAUREEN MOLLOY

Acton, Mass.

Ascom Timeplex, Inc. is gearing up to enter the ATM market with a new line of Asynchronous Transfer Mode switches designed to address high-speed network needs ranging from the department to the enterprise level.

The three switches, which are expected to be available by the end of next year, will scale in capacity from 1G to 19G bit/sec. All three will be equipped with signaling and traffic management capabilities and support existing local-area networks and traditional time-division multiplexer (TDM) equipment, said Bruce McClure, an Ascom Timeplex senior vice president.

JOHN THOMPSON

McCLURE

McClure, founder and former president of Synernetics, Inc., was hired to lead Ascom Timeplex's ATM efforts in the newly formed Advanced Products Business Unit here.

"We are seriously investing in ATM but with a slightly different perspective than some folks," McClure said. "I don't see ATM as an end itself. It's a facilitating technology. We'd like to develop solutions that unify the LAN and WAN and simplify the network by increasing its intelligence."

The switches will employ a so-called Unifying Architecture to support the vendor's existing line of multiplexers, routers, X.25 packet switches and Synchronous Optical Network (SONET) switches, he said.

The work group ATM switch will have a capacity of up to 600M bit/sec, while the departmental and enterprise switch will have a maximum capacity of 2.4G and 19.2G bit/sec, respectively. McClure said the switching architecture is designed to accommodate needs at 100G bit/sec or more as user needs require.

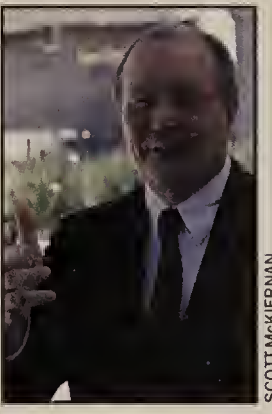
"We want an architecture that can scale to several hundred gigabits, but we don't see that as the design target today," he added. "The idea is to get an architecture that can scale by design, and then we can implement different silicon at various starting points."

Although the switches will be developed almost exclusively in-house, the ATM chipset will be based, in part, on technology licensed from Washington University in St. Louis.

I/O MODULES

Although a definitive count has yet to be determined, the switches will support from eight to 20 I/O modules. On the local side, it will support Ethernet, token-ring and Fiber Distributed Data Interface traffic. Wide-area network interface support will include X.25, frame relay, Switched Multimegabit Data Services and Broadband Integrated Services Digital Network traffic.

Each of the interface modules will be compatible across all three ATM switches. That is, a user that deploys a work group switch can later migrate those I/O modules to the enterprise switch. Port speeds will range from those necessary to support TDM equipment on up to SONET speeds of 155M and 622M for switch-to-switch links.


SCOTT McKIERNAN

O'CONNELL

The switches will use the proprietary Autonomous Virtual Network Protocol to convert all incoming traffic into what Ascom Timplex calls a canonical ATM format.

"We have one way of doing ATM, and by having one way that's flexible, we can convert anything in the world to this one format," McClure said.

The equipment is being built from the ground up to support distributed signaling and traffic management functions. Network management will be based on object-oriented technology and integrated with systems used to control other Ascom Timeplex equipment.

William O'Connor, Ascom Timeplex's president and chief executive officer, said the next-generation ATM switching technology will ultimately be incorporated across Ascom Timeplex's entire product line.

✆Ascom Timeplex: (201) 573-6400.

Compaq ups server ante with product rollout

BY CARYN GILLOOLY

Houston

Compaq Computer Corp. is expected this week to roll out a new server line that analysts say will launch the company into direct competition with the traditional superserver vendors.

At its Innovate '93 technology summit here, Compaq will bring out servers that support multiprocessing capabilities using as many as four Intel Corp. Pentium processors. The machines also have fault-tolerant features designed to enable them to function as application or database servers on corporate nets.

According to sources, the new server line is expected to have the same TriFlex I/O architecture as Compaq's current SystemPro/XL line. With TriFlex, separate processor, memory and I/O subsystems are connected by high-speed buses, which eliminates bottlenecks that can occur when all three functions share the same bus.

The new line, however, is expected to provide fault-tolerance features not found in the SystemPro/XL, such as hot-swappable disk capability, a built-in uninterruptible power supply and error-correcting memory. Also, administrators will be able to manage the new servers using Compaq's Insight Manager software, which runs on any network workstation and gives the administrator detailed information on the inner workings of a Compaq server.

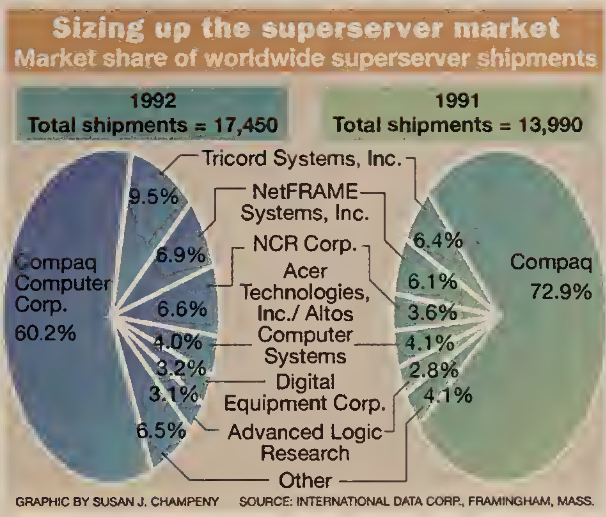
The new systems will support one, two or four 486DX2 or Pentium processors and are expected to start at less than $30,000. Although a Compaq spokeswoman confirmed that the company is introducing multiprocessing Pentium-based servers this week, she declined to give further product details.

MOVING UP

Over the past two years, Compaq has been losing some of its hold on the server market to higher end players such as Tricord Systems, Inc., NetFRAME Systems, Inc. and NCR Corp., according to a study by International Data Corp., a research and consulting firm in Framingham, Mass. (see graphic, this page).

Sizing up the superserver market

Market share of worldwide superserver shipments



GRAPHIC BY SUSAN J. CHAMPENY SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

As customers move higher end applications to local-area networks, they need higher end systems to support these applications, analysts said. Until now, Compaq has had most of its success in the LAN file and print server market, but did not offer a machine to compete in the high-end.

"This announcement of a four-processor machine is a critical step for Compaq to help them break out of the traditional file-and print-server market," said Brad Day, principal analyst for the client server systems group at Dataquest, Inc., a research firm based in San Jose, Calif. "This makes them much more able to hit the database server market."

According to Day, the key differentiating factors between a traditional file-and-print server and a database server are good CPU scalability and a sophisticated I/O architecture. "Compaq's TriFlex architecture provided the latter, and this completes the story," he said.

Other analysts agreed, but some pointed to Compaq's low price point as the factor that will virtually ensure the company's success with its higher end offering. "The pricing scale is what you'd expect from Compaq — the sub-$30,000 range," said one analyst who requested anonymity. "But the functionality is going to compete with the servers you'd traditionally pay a lot more for.

"That's the biggest part of this story," the analyst continued. "This $30,000 machine will start nipping at the heels of some of the $750,000 machines."

NCR-NetTech tackle SNA-TCP/IP management

BY MICHAEL COONEY

Raleigh, N.C.

NetTech and NCR Corp. are tying together their respective network management tools to produce a system that will let users monitor and control legacy SNA and multivendor TCP/IP nets from a single console.

According to officials at NetTech, the firms will develop an interface between NCR's StarSentry Simple Network Management Protocol platform and NetTech's EView family of NetView Systems Network Architecture net management tools to let users monitor and control their SNA and SNMP devices from the StarSentry console.

NCR declined to comment about the project.

EView is a family of software tools that works with IBM's host-based NetView network management system.

The EView tools include interfaces into Information/Manager — NetView's problem, change and configuration management database — and automation features that allow users to write commands that can be automatically kicked off in response to user-defined events.

"From the StarSentry platform, users will have complete access and control over their SNA world," said Ellis Gregory, president of NetTech.

With the StarSentry/EView interface, host-based EView applications will be able to gather net management and device data from NetView and VTAM then pass it over an LU 6.2 session to the StarSentry platform.

StarSentry will build an SNA topology map and store it in its database.

The development effort will stop short of full-fledged integration, however. Instead, the SNA topology map and alerts passed from the host will be displayed side by side with the SNMP topology on StarSentry's graphical monitor.

Once alert data is passed from the host to StarSentry, EView's automation programs can respond to them automatically or the operator can take actions to fix the problem.

The NCR-NetTech announcement is a direct shot at what IBM has promised to do with its NetView/6000 SNMP manager and a proposed new application dubbed SNA/6000.

SNA/6000, which has not yet been formally announced, is a NetView/6000 application that will likewise pull data from NetView using LU 6.2. NetView/6000 will then have the capability to see and manage the SNA and SNMP environments simultaneously.

"The IBM NetView/6000 and the NetTech-NCR products are most useful for small to medium-size SNA shops, because once you get into the millions of alerts a large SNA shop can generate every day, these small platforms can't handle it," said Frank Dzubeck, president of Communications Network Architects, Inc., a consultancy in Washington, D.C. "The platforms will have their place, but they aren't for everybody."

The announcement will be NetTech's second major technology partnership within a year. Last fall, NetTech and hub maker Cabletron Systems, Inc. announced BlueVision, software that lets Cabletron's Spectrum net management platform receive SNA management alerts from NetView (*NW*, Oct. 12, 1992, page 1).

Pricing and availability for the NCR-NetTech product was not available.

✆NetTech: (919) 781-7887.

Announcing the first network printer

Operating System	Topology
Novell Netware	*Ethernet/802.3
	Token Ring (4/16 Mbps)
Microsoft®	*802.3
LAN Manager	Token Ring (4/16Mbps)
Windows for	*802.3
Workgroups	Token Ring (4/16 Mbps)
Windows NT	*802.3
	Token Ring (4/16 Mbps)
IBM LAN Server	*802.3
	Token Ring (4/16 Mbps)
AppleTalk	*LocalTalk
	*EtherTalk
HP-UX**	*Ethernet
SunOS**	*Ethernet
Solaris**	*Ethernet
SCO UNIX®	*Ethernet

*Standard in the HP LaserJet 4SI MX printer. **For operating HP-UX, SunOS or Solaris, a one-time purchase of $199 in configuration software is required. Adobe and PostScript are trademarks of Adobe Systems Inc. which may be registered in certain jurisdictions. Microsoft is a U.S. registered trademark of Microsoft Corporation. UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries. †In Canada call 1-800-387-3867, Ext. 7299. ©1993 Hewlett-Packard PE12353

Multiple environments are no longer worlds apart. Even if you have Novell Netware on one network, HP-UX on another and EtherTalk on a third, the new HP LaserJet 4Si MX printer easily connects across platforms. Automatically.

The HP LaserJet 4Si MX printer comes out-of-the-box preconfigured for multiple environments. There's nothing more to do than plug-and-play. All interfaces are simultaneously hot, making switching so seamless, end-users won't even notice.

What's more, HP's LaserJet 4Si MX printer is ready to handle whatever needs come down the

that adapts to multiple environments.

pike. More operating systems? No problem. As your network system continues to evolve, the capabilities of this printer are no longer just impressive. They're indispensable.

The HP LaserJet 4Si MX printer is loaded with features that define state-of-the-art. HP's enhanced PCL5 and genuine PostScript™ Level 2 software from Adobe™ come standard. Printer environments are saved while switching. Setup is a cinch with network software utilities and drivers included in the box. And, if you need any reassurance about trouble-free operation, you have it in our Simple Network Management Protocol (SNMP) support.

At 17 ppm, this is the fastest LaserJet ever, with I/Os and RISC-based formatter capabilities matched to support its speed. It delivers impeccable 600 dpi print quality—thanks to HP's microfine toner and Resolution Enhancement technology. Plus, it comes standard with two 500 sheet input trays.

But what if you don't need the full capabilities of the HP LaserJet 4Si MX printer right away? HP offers another printer that's probably a perfect fit. The HP LaserJet 4Si printer delivers the identical 17 ppm performance and superb 600 dpi print quality. It also has room to grow. The two MIO expansion slots let you add HP JetDirect network interface or third party cards. And you can add on Adobe's genuine PostScript Level 2 software and SIMM memory modules, as you need them.

To find out more about the multiple-network HP LaserJet 4Si MX printer and the upgradable HP LaserJet 4Si printer just call 1-800-LASERJET, Ext. 7299.†
Capabilities this advanced make a world of difference—in any environment.

HEWLETT
PACKARD

Da Vinci E-mail integrated with latest Novell offerings

BY BOB BROWN

Raleigh, N.C.

Da Vinci Systems Corp., one of the leading providers of MHS-based electronic mail systems, last week introduced a new version of its software that boasts tighter integration with Novell, Inc. nets and administrative capabilities driven by a graphical user interface (GUI).

Da Vinci's eMail 2.5, a Novell Message Handling Service (MHS)-based offering, is integrated with Novell's NetWare Global MHS multiprotocol E-mail server and NetWare 4.0 local-area net operating system. The link will simplify administration and enable users to exchange messages with other E-mail systems.

It will also enable eMail to exploit NetWare 4.0's new Directory Service, said Don Rainey, Da Vinci's executive vice president. This means eMail directories can be built on and automatically synchronize with NetWare directories, eliminating the need for administrators to manually synchronize the two.

Paul Doherty, director of development at Da Vinci, said the idea is to try to save users from having to "spend hundreds of hours creating accounts for NetWare users and then having to virtually duplicate that effort in building a names directory" for E-mail.

Da Vinci's support for NetWare Global MHS should benefit eMail users in several ways, as well, Doherty said.

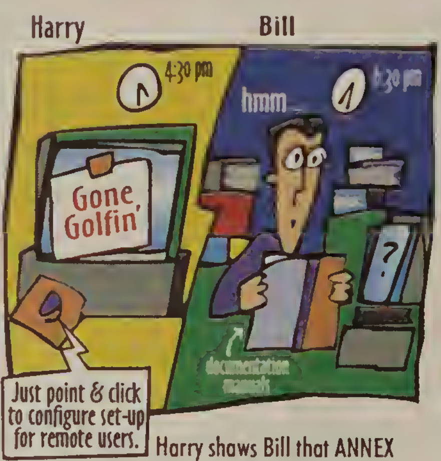
NetWare Global MHS is essentially two products in one: an E-mail switch that enables messages to be exchanged between different E-mail systems and a messaging extension to Novell's Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) protocol.

By working with NetWare Global MHS, eMail users will be able to exchange messages with users of other mail systems supported by NetWare Global MHS, such as those based on the Simple Mail Transfer Protocol. Also, since

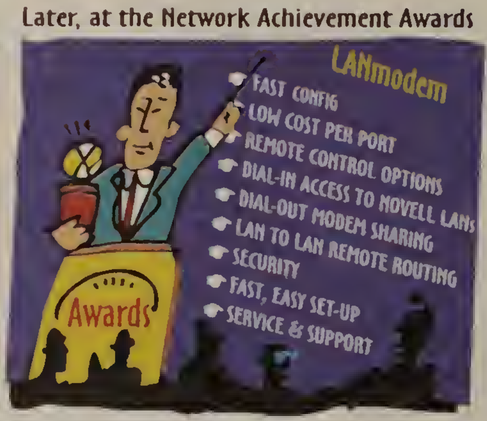
See **Da Vinci**, *page 90*

Introducing *something new in remote node connections:* **Speed.**

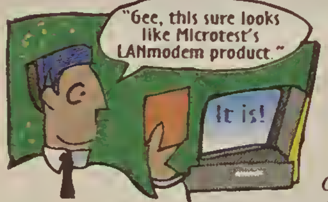
Harry: minutes to log in
Bill: 1 hour later... still waiting
hmm...
Harry and Bill demonstrate the difference between ANNEX™ LANmodem with Fast Config and other remote node products.



Harry shows Bill that ANNEX LANmodem's remote node with FastConfig is faster and easier to set up than other remote node methods.



Harry demonstrates why he specifies ANNEX LANmodem as a complete solution.



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Circle Reader Service #29

EIS tools

Continued from page 3

chases of applications for marketing, budgeting and sales management, said Gary O'Connell, IRI's vice president of product marketing. "Some EIS vendors haven't been doing well with EIS tool kits because they aren't capable of accessing corporate data on stand-alone PCs, LANs and legacy systems," he said.

IRI is planning a new release of its Express product by year end that will beef up support for SQL databases by embracing Microsoft Corp.'s Open Database Connectivity specification. The new version of Express will also support Microsoft's Object Linking and Embedding 2.0, which will let users embed Express tables or graphics into word processing documents or spreadsheets.

Clicking on the table or graphic will automatically activate the Express program, allowing users to navigate through the original data without leaving a Windows application.

Plunging into EIS applications in a big way is Planning Sciences, which will announce an object-oriented tool for developing analytical applications that run on multiple platforms. Called Gentium, the product will present EIS functions, such as drill-down capabilities and matrix and exception reporting, as objects within a tool palette. Gentium will also support read and write access to a variety of data sources via third-party data access tools. Support is also planned for hypertext links.

Unlike the other EIS players, Pilot Software is continuing to focus its energies on enhancing its existing EIS tool set instead of developing value-added applications. At the EIS Institute conference, Pilot Software will announce LightShip Link, a proprietary tool for accessing SQL databases, and LightShip Modeler, a Windows-based tool for modeling complex analytical applications.

The firm will also announce an improved LightShip user interface, a faster computational engine for presenting multidimensional data views and new Unix versions of its Command Center Plus product.

CORRECTION

David Meyer, systems integrations manager at the Washington, D.C.-based Nature Conservancy, said the difficulty his organization had with the StreetTalk III global directory service of Banyan Systems, Inc. VINES Release 5.52(5) was fixed by a patch issued by Banyan ("Users Grapple With Latest VINES," Sept. 6, page 8). A separate routing problem, which Banyan has since resolved, is what prompted the organization to temporarily halt its server ugrades.

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Please Answer ALL Questions, Sign and Date the Form.

1 Industry: (check one only)

01. ☐ Manufacturers (other than Computer/Communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04 ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade/Business Services
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
13. ☐ Government, State/Local
14. ☐ Government, Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (Independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/VAN/ Systems Houses
22. ☐ Distributors, Computer Related
23. ☐ Distributors, Communications Related
24. ☐ Other________________________

2 What is your job function? (check one only)

NETWORKING MANAGEMENT

1. ☐ Networking Mgmt.
2. ☐ LAN Mgmt.
3. ☐ Datacom/Telecom Mgmt.
4. ☐ Engineering Mgmt.

MIS MANAGEMENT

5. ☐ MIS, IS, IT Mgmt.
6. ☐ Engineering Mgmt.

CORPORATE MANAGEMENT

7. ☐ Corporate Mgmt. (CIO, CEO, Pres., VP, Dir., Mgr., Financial Mgmt.)
8. ☐ Consultant (Independent)
9. ☐ Other________________________

3 My responsibilities include: (check one only)

1. ☐ LANs/ Internetworking/ WANs
2. ☐ LANs/ Internetworking
3. ☐ LANs
4. ☐ WANs
5. ☐ None

4 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9.
6. ☐ 1
7. ☐ None

5 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. Scope (check one only)

1. ☐ Corporatewide
2. ☐ Multienterprise (consultants)
3. ☐ Departmental

B. Involvement (check all that apply)

1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ None (A or B)

6 Check all that apply in Columns A and B:

A: I am involved in the purchase of the following products/services.

B: I plan to purchase the following products/services in the next year.

Involved A / Plan to Purchase B

LOCAL-AREA NETWORKS

☐ 01. ☐ Local-Area Networks
☐ 02. ☐ LAN Servers
☐ 03. ☐ LAN Operating Systems Software
☐ 04 ☐ Superservers
☐ 05. ☐ Data Base Servers (Oracle, Sybase, etc).
☐ 06. ☐ Terminal Servers
☐ 07. ☐ LAN Services
☐ 08. ☐ LAN Storage Devices (optical, tape, disk, etc,. including backup systems)
☐ 09. ☐ Network Test Equipment
☐ 10. ☐ Hubs
☐ 11. ☐ Cables, Connectors, Baluns
☐ 12. ☐ UPS
☐ 13. ☐ Network Adapter Boards
☐ 14 ☐ Peer-to-Peer LANs
☐ 15. ☐ Wireless LANs
☐ 16. ☐ SNMP Network Management
☐ 17. ☐ ATM (Asynchronous Transfer Mode)

A B **INTERNETWORKING**

☐ 18. ☐ Bridges
☐ 19. ☐ Routers
☐ 20. ☐ Gateways
☐ 21. ☐ Bridge/Routers
☐ 22. ☐ Hubs
☐ 23. ☐ Intelligent Hubs
☐ 24 ☐ Communications Servers

Involved / Plan to Purchase

A B **COMPUTERS/PERIPHERALS**

☐ 25. ☐ Micros/PCs
☐ 26. ☐ Minis
☐ 27. ☐ Mainframes
☐ 28. ☐ Pen-Based
☐ 29. ☐ Laptops
☐ 30. ☐ Workstations
☐ 31. ☐ Image Processing Workstations
☐ 32. ☐ Front-End Processors
☐ 33. ☐ Terminals
☐ 34. ☐ Printers
☐ 35. ☐ Cluster Controllers
☐ 36. ☐ Fax Machines
☐ 37. ☐ X-Terminals

A B **SOFTWARE/APPLICATIONS**

☐ 38. ☐ Network Management
☐ 39. ☐ Micro to Mainframe
☐ 40. ☐ Security
☐ 41. ☐ Communication/Terminal Emulation
☐ 42. ☐ Word Processing
☐ 43. ☐ Operating Systems
☐ 44. ☐ Business Applications (Finance/Mfg/HR)
☐ 45. ☐ Applications Development
☐ 46. ☐ Data Base Management
☐ 47. ☐ Spreadsheet
☐ 48. ☐ Groupware
☐ 49. ☐ EDI
☐ 50. ☐ E-Mail
☐ 51. ☐ Windows/Graphical User Interface
☐ 52. ☐ 4GL/Development
☐ 53. ☐ Multimedia
☐ 54. ☐ Graphics
☐ 55. ☐ Utilities

A B **WIDE-AREA NETWORK EQUIPMENT/SERVICES**

☐ 56. ☐ Modems (9.6K bps and over)
☐ 57. ☐ Modems (under 9.6K bps)
☐ 58. ☐ T-1
☐ 59. ☐ T-3
☐ 60. ☐ Fractional T-1
☐ 61. ☐ Data Switches
☐ 62. ☐ SMDS
☐ 63. ☐ ATM (Asynchronous Transfer Mode)
☐ 64. ☐ Matrix Switches
☐ 65. ☐ Packet Switches
☐ 66. ☐ Protocol Converters
☐ 67. ☐ Diagnostic/Test Equipment
☐ 68. ☐ DSU/CSUs
☐ 69 ☐ Microwave
☐ 70. ☐ Fax Boards/Modems
☐ 71. ☐ VSAT
☐ 72. ☐ Fiber Optic
☐ 73. ☐ Satellite
☐ 74. ☐ ISDN
☐ 75. ☐ PBXs (over 1000 lines)
☐ 76. ☐ PBXs (under 1000 lines)
☐ 77. ☐ Automatic Call Distributors
☐ 78. ☐ Voice Messaging Systems
☐ 79. ☐ Videoconferencing Systems
☐ 80. ☐ Voice Response/Processing
☐ 81. ☐ Switched Voice
☐ 82. ☐ Dedicated Leased Line
☐ 83. ☐ Switched Data
☐ 84. ☐ Centrex
☐ 85. ☐ E-Mail/On-Line Information
☐ 86. ☐ Image Processing
☐ 87. ☐ Audio Teleconferencing
☐ 88. ☐ Local Services
☐ 89. ☐ WATS MTs
☐ 90. ☐ International
☐ 91. ☐ Virtual Networks
☐ 92. ☐ Frame Relay
☐ 93. ☐ Value Added Services
☐ XX ☐ None of the above (1-93)

7 What is the total number of A: LANs B: Workstations/Nodes in your entire organization?

	LANs A		Workstations/ Nodes B
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	9 or Less	☐

8 Which of the following network platforms are currently installed/planned in the next year?

NETWORK ARCHITECTURES

Present / Planned

☐ 01. ☐ SNA
☐ 02. ☐ DECNET
☐ 03. ☐ MAP/TOP
☐ 04. ☐ TCP/IP
☐ 05. ☐ DCA (Unisys)
☐ 06. ☐ X.25
☐ 07. ☐ NOVELL IPX/SPX
☐ 08. ☐ APPC/APPN/LU 6.2
☐ 09. ☐ NETBIOS
☐ 10. ☐ OSI
☐ 11. ☐ APPLETALK
☐ 12. ☐ OTHER________________________

LAN OPERATING SYSTEM

☐ 13. ☐ LOCALTALK (APPLETALK)
☐ 14. ☐ BANYAN (VINES)
☐ 15. ☐ DCA (IRMALAN)
☐ 16. ☐ DCA (10-NET)
☐ 17. ☐ IBM (LAN SERVER)
☐ 18. ☐ IBM (PC LAN PROGRAM)
☐ 19. ☐ MICROSOFT (LAN MANAGER)
☐ 20. ☐ UNGERMANN-BASS (NET/1)
☐ 21. ☐ NOVELL (NETWARE, 2.X, 3.X, 4.X)
☐ 22. ☐ PROTEON (PRONET)
☐ 23. ☐ SITKA (TOPS)
☐ 24. ☐ 3COM (3+, 3+OPEN)
☐ 25. ☐ ARTISOFT (LANTASTIC)
☐ 26. ☐ HAYES (LANSTEP)
☐ 27. ☐ DEC (PATHWORKS)
☐ 28. ☐ OTHER________________________

LAN ENVIRONMENT

☐ 29. ☐ 4M TOKEN RING
☐ 30. ☐ 16M TOKEN RING
☐ 31. ☐ ARCNET
☐ 32. ☐ ETHERNET
☐ 33. ☐ STARLAN
☐ 34. ☐ FDDI
☐ 35. ☐ LOCALTALK
☐ 36. ☐ 10BASE-T
☐ 37. ☐ OTHER________________________

OPERATING SYSTEM

☐ 38. ☐ DOS
☐ 39. ☐ UNIX/XENIX/AIX
☐ 40. ☐ OS/2
☐ 41. ☐ OS/2 2.X
☐ 42. ☐ MVS
☐ 43. ☐ VM
☐ 44. ☐ VMS
☐ 45. ☐ MACINTOSH
☐ 46. ☐ WINDOWS
N/A 47. ☐ WINDOWS NT
☐ 48. ☐ X WINDOWS
☐ 49. ☐ OTHER________________________

9 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

10 Which of the following hardware platforms is installed/planned in your company? (check all that apply)

	Mainframes Currently Installed	Planned Next Year	Minis Currently Installed	Planned Next Year
01. DEC	☐	☐	☐	☐
02. IBM	☐	☐	☐	☐
03. AMDAHL	☐	☐	☐	☐
04. AT&T	☐	☐	☐	☐
05. BULL HNIS	☐	☐	☐	☐
06. DATA GENERAL	☐	☐	☐	☐
07. HP	☐	☐	☐	☐
08. TANDEM	☐	☐	☐	☐
09. UNISYS	☐	☐	☐	☐
10. OTHER____________	☐	☐	☐	☐

MICROCOMPUTERS
(fill in the numbers)

	NUMBER INSTALLED	NUMBER PLANNED NEXT YEAR
11. MACINTOSH 20, 30, 40		
12. MACINTOSH OTHER		
13. PCs BASED ON 80586	N/A	
14. PCs BASED ON 80486		
15. PCs BASED ON 80386		
16. PCs BASED ON 80286		
17. PCs BASED ON 8086/8088		
18. RISC / UNIX BASED WKSTNS		
19. OTHER		

11 Estimated value of networking equipment and services:

A. Which you helped specify, recommended or approved in the last year?

B. Which you plan to help specify, recommend or approve in the next year?

A B

☐ 1. ☐ $100 million and over
☐ 2. ☐ $50 - $99.9 million
☐ 3. ☐ $25 - $49.9 million
☐ 4. ☐ $20 - $24.9 million
☐ 5. ☐ $10 - $19.9 million
☐ 6. ☐ $5 - $9.9 million
☐ 7. ☐ $1 - $4.9 million
☐ 8. ☐ $500,000 - $999,999
☐ 9. ☐ $499,999 or less

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ Over $10 billion
2. ☐ $1 to $9.9 billion
3. ☐ $500 to $999.9 million
4. ☐ $100 to $499.9 million
5. ☐ $50 to $99.9 million
6. ☐ $10 to $49 9 million
7. ☐ $5 to $9.9 million
8. ☐ $4.9 million or less

13 Estimated number of employees for your entire corporation:

1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

9226

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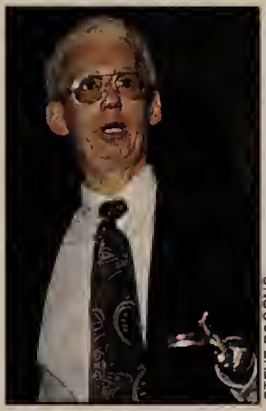
IBM ThinkPads go CDPD

BY ELLEN MESSMER

New York

IBM last week unveiled four notebook computers in its ThinkPad line that can support wireless communications using an internal Cellular Digital Packet Data (CDPD) module.

The module, developed by IBM and Pacific Communication Sciences, Inc., will enable all four machines in the new ThinkPad 750 series — the 750C color-screen model, the 750CS dual-scan color, the 750 monochrome version and the 750P pen-based computer — to send data, facsimiles and electronic mail.


STEVE BOORNS

COLEMAN

Designed for insertion under the ThinkPad 750's pop-up keyboard, the module uses an external antenna and supports CDPD at 19.2K bit/sec using either the Transmission Control Protocol/Internet Protocol or Open Systems Interconnection protocols.

Although CDPD-based services are not yet available, eight cellular carriers nationwide have announced plans to implement CDPD in their networks. McCaw Communications, Inc., which will begin rolling out CDPD services this fall, has promised coverage in all its markets by mid-1994.

But recognizing that CDPD may not be available everywhere, IBM packed diverse communications features into the module so that customers will have a fair chance of finding alternative means for wireless communications.

"We're trying to take advantage of what comes along," said Michael Coleman, vice president of marketing and brand management at IBM PC Company — Americas. "That's why the modular design."

The communications module provides access to commonly available circuit-switched cellular service, so users could send data, fax and E-mail by placing a regular cellular phone call. By plugging in a cellular phone, the ThinkPad can also support voice.

IBM will begin trials with cellular carriers next month to test its communications module and plans shipment for January. Sources said the communications module will come bundled with software for electronic mail, database query, order entry, phone dialing, bulletin boards and faxing. IBM is working with software developers now to line up what will be available.

After release of the module, IBM plans to release an external version in February to work with the older ThinkPad 720 series and other vendor computers, sources said.

STEVE BOORNS

CAFLIN

In other enhancements, IBM said support for infrared communications is planned for first-quarter 1994. IBM also plans release of a television tuner that will allow customers to receive TV programs.

The ability to deliver information wirelessly will assist field workers, salespeople and anyone on the go, Coleman said, adding, "And you can watch a little CNN on the side."

IBM will also offer what it calls the ThinkPad Dock I, a boom box-looking unit that accepts a ThinkPad for audiovisual presentatations. The 6-lb. Dock I contains integrated stereo speakers and room for an optional CDROM drive and a video adapter.

Bruce Caflin, president of IBM PC — Americas, said the 750 ThinkPad series notebooks, all with PCMCIA slots, weigh between 5 1/2 and 6 1/2 lbs., which is less than previous ThinkPad models.

The 750 models support longer battery life: 3 2/5 to 8 hours for color and 5 3/10 to 12 hours for monochrome, compared to 2 1/5 to 3 4/5 hours for the older ThinkPads.

The four new ThinkPad models are available now, with the exception of the 750CS, ranging in price from $3,199 to $5,249. The CDPD communications module will cost $1,999, and the docking unit is $899.

©IBM: (800) 772-2227.

SMC embraces both plans for fast Ethernet

BY SKIP MACASKILL

Hauppauge, N.Y.

Standard Microsystems Corp. (SMC) last week moved to cover its 100M bit/sec Ethernet bases by announcing hub modules that support the 100Base-VG proposal from the Hewlett-Packard Co.-led team.

SMC, which already voiced support for a fast Ethernet proposal from 3Com Corp. and SynOptics Communications, Inc., becomes one of the first vendors to publicly announce it will support both approaches.

There are several differences between the proposals — both of which are being reviewed by the Institute of Electrical and Electronics Engineers, Inc. — the biggest being use of the carrier-sense multiple access with collision detection access method (see graphic, this page).

3Com and SynOptics have kept CSMA/CD intact in their proposal, while HP has opted to do away with it, claiming that keeping the Ethernet packet size the same is more important in terms of running applications.

"The CSMA/CD-based technology is really where our chip expertise and knowledge base are, so our primary development effort will continue there," said Lance Murrah, vice president of marketing at SMC. "But you can't ignore 100Base-VG, because it's going to be a reality."

Underscoring its priorities, SMC announced it will develop a line of products for the CSMA/CD technology — including hub modules, fixed-port work group hubs and workstation adapter cards — but only a hub module for the 100Base-VG approach.

Both types of modules will work in SMC's Elite Switching (ES)/1 switching hub. The multiport modules will be hot-swappable, and SMC will provide transparent bridging between the different technologies.

"In the ES/1, our goal is to make everything work together because users will need a box somewhere in their network that can mix and match line speeds and packet formats, "Murrah said.

SMC expects to deliver the 100Base-VG hub modules in early 1994 and the CSMA/CD-based modules by mid-1994. The company declined to divulge more product details.

"We're convinced that the CSMA/CD proposal might be the eventual winner based on the broad industry support and the fact that most products will allow users to switch between the 10M and 100M bit/sec versions as needed — much like they can do today with 4M and 16M bit/sec token-ring products," Murrah said. "The 100Base-VG approach, however, will attract users because it's better geared to multimedia applications in that it offers a way to prioritize traffic."

Whether one method will ultimately win out will be determined by users, but the fact remains that there is demand for higher speed networks at the desktop, Murrah added.

Revving up Ethernet

Proposal	100Base-VG	100M bit/sec Ethernet
Signaling	Quartet Signaling approach, which uses all 4 pairs of wires to send or receive data	Duet Signaling approach, which retains Ethernet's CSMA/CD scheme using 1 pair of wires to send data and another to receive data
Distance	Retains existing distance limit of 2,500 meters	Supports reduction of distance limit to 250 meters
Traffic prioritization	Demand Priority scheme, which assigns high or low priority to each packet	None
Wiring*	Category 3 voice-grade unshielded twisted pair (UTP), fiber and IBM Type 1 shielded twisted pair (STP)	Category 5 data-grade UTP*

* Have announced plans to support Category 3 UTP, fiber and STP wiring.

GRAPHIC BY SUSAN J. CHAMPENEY SOURCE: *NETWORK WORLD*

And fast Ethernet may have an advantage over competing technologies such as Fiber Distributed Data Interface based on cost.

While FDDI prices, especially with the new copper-based products, are moving down, fast Ethernet is expected to only cost twice as much as current 10Base-T prices, and Murrah sees that gap closing.

"In reality, there is nothing stopping fast Ethernet from being the same price as 10Base-T because there is nothing inherently more complex in it," he said. "Within a year of introduction, it's possible the price points can be equal. If that happens, fast Ethernet is foing to be hot."

Banyan, Legato support multiserver backup

BY CHRISTINE BURNS

Westborough, Mass.

Banyan Systems, Inc. last week announced a partnership with Legato Systems, Inc. to develop, among other things, a data backup and restoral system that will work with servers and clients on VINES, Unix and NetWare networks across an enterprise.

The companies' Enterprise Backup and Restore (EBR) will handle centralized backup for Banyan VINES, Novell, Inc. NetWare 3.X and 4.X, and Unix servers, as well as DOS, Windows, Macintosh and OS/2 clients. Local-area network administrators will be able to manage the backup process from any workstation on the net.

"With EBR, we don't care what kind of servers or what kind of clients are your network. We replace the piecemeal backup and restore facilities contained in each with a unified system controlled from one place," said Drew Wolff, product line manager for EBR.

EBR will be available across all Banyan platforms including VINES, Enterprise Network Services and VINES for The Santa Cruz Operation, Inc. (SCO) Unix. EBR will be integrated into Banyan's StreetTalk III global directory service, which will let LAN managers set up and control backup processes using existing node names and addresses.

"Customers are moving their mission-critical applications from mainframes down to distributed networks, and if they lose these files, they lose their businesses," Wolff said.

Banyan officials said EBR will serve as the foundation for other products to result from its alliance with Legato, which is a Palo Alto, Calif.-based producer of backup and storage products for Unix and NetWare environments.

Banyan is also planning a hierarchical storage management product that will enable a systems administrator to control how and when data is moved from expensive high-speed storage devices such as hard drives to other systems such as optical disk jukeboxes.

Art Beckman, manager of information technology services at Pacific Gas and Electric Co., a San Francisco-based utility with a large Banyan net, said an enterprisewide backup product would ensure that vital data is being protected.

"Having someone sitting in front of a server changing tapes during the process just doesn't cut it," Beckman said.

Thomas MacDonald, principal of the Framingham, Mass.-based consultancy, MGT Technology Group, said users have been dissatisfied with Banyan's traditional server-based approach to backup and storage in the VINES environment.

"Banyan was preaching that they were providing an enterprisewide solution in VINES, but in terms of backup, they were behaving like Novell, being server-centric," MacDonald said. "For Banyan to be fully consistent with their strategy of offering enterprisewide solutions, they had to put in place something like this which allows them to centrally back up and restore any device on the network," he said.

Henda Cada, a LAN manager controlling 23 of the 136 VINES servers running in World Bank in Washington, D.C., said the ability to back up workstations will also be a boon to her company. "Given that our workstations now have nearly as much disk space as our servers, losing a workstation can be catastrophic," Cada said.

EBR will be available mid-1994. Pricing has not yet been determined.

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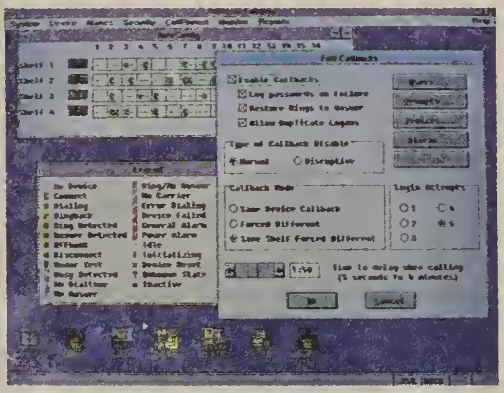

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ENTERPRISE INTERNETS

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HEALTH CARE

Net links health care providers, insurance carriers

BY MAUREEN MOLLOY

Scottsdale, Ariz.

In an effort to curb rising medical costs, a band of insurance companies last week activated a network that will enable health care providers and insurers to electronically exchange patient medical data and administrative information.

PCS Health Systems, Inc. has deployed the Health Care Information Network (HCIN) in nine states as the initial step in creating the first nationwide network for exchanging health care data. PCS, a subsidiary of pharmaceutical products provider McKesson Corp., is operating the system for the National Electronic Information Corp. (NEIC), a group of commercial insurance carriers that includes Aetna Life and Casualty Co., CIGNA Corp., John Hancock Insurance Group, Inc., Metropolitan Life Insurance Co. and PacifiCare.

HCIN is expected to save money by letting medical care providers instantly verify patient eligibility and benefit coverage.

HCIN is expected to save time and money by letting hospital, medical and dental care providers instantly verify patient eligibility and employee health benefit coverage, as well as attendant deductibles. Later, HCIN will support additional capabilities, such as primary care physician authorizations, referrals and claim status inquires.

HOW IT WORKS

A hospital, for instance, would send a PCS-developed transaction set from its network to the PCS network via AT&T's VTNS 800 service or a leased line. PCS then uses a Tandem Computers, Inc. machine to route the request to the appropriate insurance company. After processing the transaction, the insurance carrier sends the response data back to the hosptial via the PCS net. The average transaction is performed in about 20 seconds.

The HCIN launch follows two years of research, development and testing by PCS and NEIC. Health care providers, software vendors and managed care organizations also participated in the development of the net, according to Robert Ashworth, executive vice president and chief information officer of PCS.

The new network is modeled after PCS' existing Recap system, which adjudicates nearly 200 million pharmacy claims annually and eliminates paperwork by enabling PCS to electronically assess a patient's eligibility while the patient is at the pharmacy. HCIN will essentially be replicating Recap in hospitals and doctor offices.

After being pilot-tested, HCIN has moved into full-scale operation in California, Connecticut, Florida, Illinois, New York, New Jersey, Ohio, Texas and Virginia. By the end of 1994, it is estimated that more than 80 million Americans will be served by the system.

☎PCS: (602) 391-4138.

IBM pumps blue blood back into the AS/400

Enhances server role in enterprisewide nets.

BY MICHAEL COONEY

New York

IBM last week unwrapped new hardware and software designed to enhance the Application System/400's role as a server in enterprisewide client/server nets.

The announcements included three AS/400 models designed specifically to act as servers, as well as improved support for Novell, Inc. and Apple Computer, Inc. local-area networks.

The firm also announced a faster version of its PC Support program and new Unix connectivity software designed to improve Unix access to AS/400 hosts.

"IBM is trying to [open up] the AS/400 in hopes that it will enter markets previously closed to it," said Mark Peterson, director of market research at ADM Consulting, Inc. in Cheshire, Conn. "It's a big step forward."

As expected, the new mid-range server boxes — the Models 100, 135 and 140 — are built on the low-end AS/400 9404 platform, but they offer three to five times the performance of existing 9404s, IBM said (*NW*, Sept. 6, page 4). The new models use existing OS/400 code optimized for the new processors.

The largest AS/400, the Model 140, can support six Token-Ring or Ethernet LAN adapters, 20 communications lines at speeds up to 56K bit/sec, 47.2G bytes of storage and 512M bytes of main memory.

The midsize Model 135 supports four LAN adapters, 14 communications lines, 27.5G bytes of direct-access storage device space and 384M bytes of main memory. The smallest, the Model 100, supports two LAN adapters, 20 communications lines, 27G bytes of storage and 56M bytes of main memory.

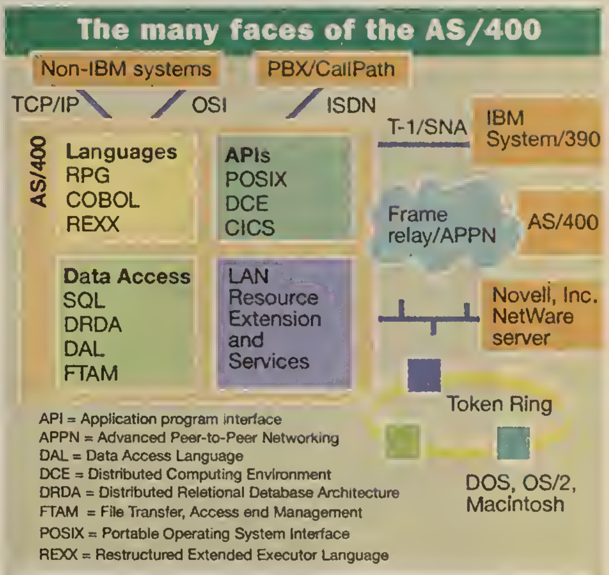
The Models 100 and 135 will be available Dec. 17 for $16,500 and $27,150, respectively. Both run specialized versions of OS/400, which will cost $1,890 and $8,100, respectively. The Model 140 will ship in March 1994 for $57,000 plus $14,330 for the operating system.

When delivered as part of IBM's AS/400 Server Series, the new machines can be preconfigured for a variety of functions.

IBM announced a prepackaged AS/400-based Apple Macintosh LAN server, complete with a new AS/400 LocalTalk adapter that lets as many as 256 Macintoshes attach directly to the server. In the past, Macintoshes had to link to the midrange box via an

See **IBM**, *page 17*

The many faces of the AS/400



API = Application program interface
APPN = Advanced Peer-to-Peer Networking
DAL = Data Access Language
DCE = Distributed Computing Environment
DRDA = Distributed Reletional Detabase Architecture
FTAM = File Transfer, Access end Management
POSIX = Portable Operating System Interface
REXX = Restructured Extended Executor Language

With last week's announcements, IBM continues to develop its AS/400 as an anything-to-anything communications and computing platform.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *NETWORK WORLD*

HELP DESK

Beta sites helped out by Apriori GT system

BY JIM DUFFY

Sunnyvale, Calif.

Beta users of Answer Computer, Inc.'s Apriori GT help desk system report they are getting to the bottom of problems faster with new features that help the product track problem resolution data.

One new feature, TexTracer, gives users access to system, network and application documentation, while a new "trigger" capability allows them to automatically launch a script file based on a set of predefined conditions. Also new with Apriori GT is the ability to group users according to system type, application and other criteria.

Apriori GT is the newest version of Answer's Apriori help desk software. It runs on Sun Microsystems, Inc., Hewlett-Packard Co. and IBM workstations, and provides access to problem resolution information for networks, systems and applications. It works on nets running the Transmission Control Protocol/Internet Protocol, Network Basic I/O System, DECnet and AppleTalk protocols.

Retail giant JCPenney Company, Inc. is using Apriori GT to support point-of-sale systems, personal computers and data entry systems throughout its nationwide chain.

When one of the back-office POS systems

See Apriori, *page 17*

BRIEFS

Computerm Corp. last week announced new boards and software that gives its Channel Extension System support for 5:1 data compression ratios, saving users money and enhancing the performance of the firm's channel extension line.

The firm will add the new products by January. Pricing was not announced.

Computerm: (800) 873-0303.

IBM Business Recovery Services (BRS) has announced new disaster recovery services for Application System/400 users. With the new AS/400 Remote Support Option, users can run their computing environment from anywhere AS/400 remote system consoles can be set up.

Users have the option of setting up an emergency shop using BRS "hot sites" located in 11 cites across the country from Atlanta to Los Angeles.

Wyse Technology, Inc. has unveiled its entry into the terminal server market with the WYSEnet product line.

WYSEnet servers are available in four models, all of which attach serial devices, such as terminals, printers and modems, to Ethernet LANs. The servers come in four- and eight-port versions that support either Transmission Control Protocol/Internet Protocol or a combination of TCP/IP and Digital Equipment Corp.'s Local Area Transport protocol. Available now, they range in price from $890 to $1,290.

Wyse: (408) 473-1200.

U.S. Robotics, Inc. has announced an expansion to its Courier line of modems, including support for V.32 terbo at 19.2K bit/sec and the ability to boost the speed of those devices up to 21.6K bit/sec.

Other enhancements include V.17 14.4K bit/sec facsimile capabilities, support for the Electronics Industry Association's Class 2.0 fax standard and automatic detection of a fax or data call.

Courier modems also now support dial-back and link security, and the V.25bis protocol for synchronous dialing.

The enhanced line of Courier modems is now shipping. They range in price from $645 to $1,295.

U.S. Robotics: (800) 342-5877.

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Novell

Continued from page 1

Loadable Modules (NLM) that can be loaded onto a NetWare 3.X or NetWare 4.X server as well as a remote node driver for each client workstation.

With the software, users on LANs can dial out using asynchronous, X.25 and Integrated Services Digital Network connections to access remote bulletin boards and asynchronous devices. In remote offices, users can dial in to access network resources including files, databases, application software, electronic mail and minicomputer services.

Novell's new product covers three bases: remote dial-in access, shared modem pools for dial-out access and support for both remote personal computer and Macintosh clients. It is noteworthy in all three areas.

The only drawback is that the product has so many features and functions, it requires a skilled network administrator familiar with the NetWare, asynchronous communications and various remote application software to get it all running smoothly.

NetWare Connect is worthy of a closer look largely for the way Novell has integrated the two approaches used by remote users who wish to connect to their office networks via dial-up networks.

The two methods are commonly called remote control and remote node. Both involve a remote computer and modem connecting to another computer with a modem on the office network, but the differences include the software loaded on the two machines and the way information is transferred between them.

With the remote control method, the keystrokes typed by the user at the remote PC are sent to the PC on the office network. And what is seen on the office PC screen is displayed on the remote PC screen, as well. The two computers can be connected via either LAN links or modems.

The advantage of remote control is speed during dial-up connection since little information needs to be transmitted over the link.

This method has two disadvantages though. First, any files altered on the remote computer must be moved back to the network by a special utility. Second, performance under Microsoft Windows is problematic and usually requires special drivers and other configuration adjustments.

Products such as Microcom, Inc.'s Carbon Copy and Symantec Corp.'s PC/Anywhere are typical of this remote access genre. And the recently introduced Version 5.0 of Norton-Lambert Corp.'s Close Up claims to work well with Windows and not require special configuration.

Remote node software uses a different means of communications than remote control. Rather than taking control of the office PC as remote control does, remote node servers are actually full-fledged members of the office network, substituting a telephone line and modem for a network card.

This method extends the LAN cable over the dial-up link and makes using network resources transparent but slow; a modem operates at one-tenth the speed of a LAN at best.

Windows works best with this method but only with 9.6K bit/sec and higher speed modems. Products of this genre include Shiva Corp.'s NetModem/E and Digital Communications Associates, Inc.'s Remote LAN Node (RLN).

Novell supports both methods in NetWare Connect, so users no longer have to choose between them. It is not the first company to offer such a hybrid product; DCA's RLN and Ocean Isle Software's ReachOut Total Remote preceded NetWare Connect.

DCA's RLN supports remote control in conjunction with Citrix Systems, Inc.'s WinView for Networks. In addition, Ocean Isle recently added remote node software to its remote control product.

The major difference between these products and Novell's new offering is that NetWare Connect users do not have to load remote node and remote control clients together to take advantage of both: Users can run either client to connect to their office networks.

NetWare Connect also offers two other advantages. Users can choose from several remote control products since NetWare Connect works with WinView, Reach Out and other remote control products such as Carbon Copy and PC/Anywhere.

Secondly, NetWare Connect is uniquely flexible. It can allow the same modems to answer remote control calls and remote node calls. In addition, administrators can allocate different modems to different tasks or have all modems available for any one task. Other products require users to dedicate modems for specific purposes.

There are other differences between RLN and NetWare Connect. Novell's product supports X.25 connections, something RLN won't have till later this year.

NetWare Connect also runs as a series of NetWare Loadable Modules on standard NetWare 3.X or 4.X servers. This leaves the choice of network adapter up to the network administrator.

RLN uses a dedicated DOS machine and requires users to purchase a different product

See **Novell**, *page 76*

If you still think landlines are the best way to link up to your LANs, then you haven't talked to Hughes Network Systems. Today, top organizations around the world have turned to Hughes, the leader in VSAT satellite communications, to provide an affordable, high-quality source of LAN interconnection for their business networks. They've found that a Hughes VSAT can offer high performance and LAN capability, with added flexibility for system changes and expansions. And only Hughes, provider of over 70% of the interactive VSAT installations in the U.S., offers service for both Ethernet and Token Ring configurations. Why be LANlocked when you can take advantage of improved communications at a comparable cost? For more information, call 301-428-5500, ext. 3751.

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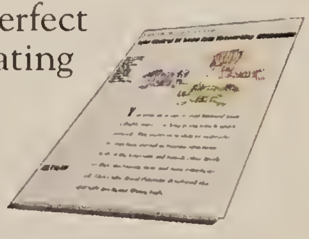

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Circle Reader Service #26

Sync fleshes out SNA frame relay support

BY MICHAEL COONEY

Irvine, Calif.

Sync Research, Inc. last week expanded its frame relay access line with a new device that will let SNA users inexpensively link small remote branch offices over public or private frame relay nets.

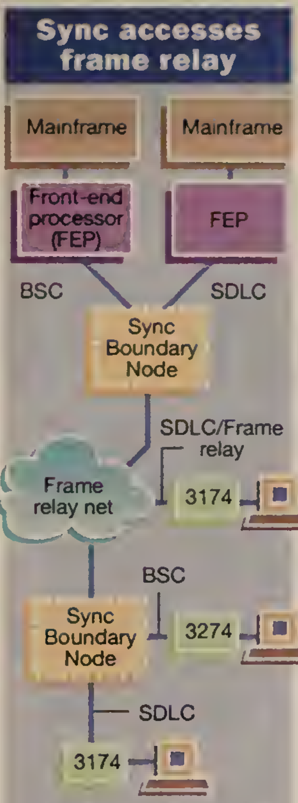
Sync's Boundary Node converts Synchronous Data Link Control and Binary Synchronous Communications traffic into native frame relay packets, letting users transport Systems Network Architecture data from SDLC and BSC devices over a frame relay net.

"The Boundary Node is aimed at users who would like to get small branch offices off of expensive leased lines and onto a less expensive frame relay net," said John Rademaker, president and chief executive officer of Sync.

The Sync box is built on the firm's existing Mini SNA Access Controller (MiniSNAC). Announced in 1990, the MiniSNAC was one of the industry's first SNA/frame relay products.

The Boundary Node differs from the MiniSNAC in that it is about half the size and less than half the price. The Boundary Node is priced at $3,000, while MiniSNAC costs $7,500. The Boundary Node supports a single wide-area frame relay link at up to 128K bit/sec and, on the local side, up to three SNA SDLC/BSC ports that operate at up to 19.2K bit/sec. Each SDLC/BSC port supports devices such as IBM's 3174 controller or BSC devices such as automated teller machines.

The device converts incoming SDLC traffic into a frame relay format and sends it over a frame relay net to another Boundary Node connected to a bridge/router or front-end processor (FEP). In the future, it could transmit directly to a remote bridge/router or FEP that supports frame relay. The device performs local SDLC polling, keeping that traffic from crossing the frame relay net.



Sync's new frame relay Boundary Node lets traditional SDLC and BSC devices link to frame relay nets.

SOURCE: SYNC RESEARCH, INC., IRVINE, CALIF.
GRAPHIC BY SUSAN J. CHAMPENY

Sync's announcement follows the introduction of a similar product line from Netlink, Inc. (*NW,* Aug. 16, page 6). Netlink's Frame Relay Access Node comes in four models supporting two to 16 64K bit/sec SDLC ports and a single wide-area net link of up to 128K bit/sec.

The Sync and Netlink boxes support the Internet Engineering Task Force's Requests For Comment 1294 and 1490, which define how multivendor, multiprotocol devices can connect and communicate over frame relay nets.

Users can manage the Sync device using IBM's NetView or any Simple Network Management Protocol management platform.

The Boundary Node will be available Oct. 1.

✆Sync: (800) 275-7962.

IBM

Continued from page 11

AppleTalk gateway.

The Apple server software will be available Dec. 17. It is priced between $4,250 and $20,000, depending on the number of users. Each client costs an additional $149.

As expected, IBM also added an AS/400 version of its LAN Resource Extension and Services (LANRES) software, which lets the AS/400 act as a server for Novell NetWare LANs. LANRES will be available in the first quarter of 1994 for $5,000.

"The specialized processors and preconfigured packages will make it easier for users to utilize the client/server functions of the AS/400," said ADM Consulting's Peterson. "Plus, AS/400 users will be able to do that and not obsolete any existing applications."

IBM also announced the Connection Program/400, which runs on the IBM RISC System/6000, Hewlett-Packard Co. 9000 and Sun Microsystems, Inc. SPARCstations, enabling those Unix platforms to connect to the AS/400.

Connection Program/400 will be available Dec. 17 at $2,400 for the RS/6000 and $2,000 for the Sun and HP workstations.

IBM added a faster version of its PC Support program, which links personal computers with the AS/400. Compared to the existing PC Support program, the new version operates up to eight times faster with Advanced Program-to-Program Communications applications and three times faster with Transmission Control Protocol/Internet Protocol applications. The new offering will be available early next year, but pricing has not yet been set.

IBM added support for frame relay and a T-1 interface to the AS/400 through a new High Speed Communications Adapter, enabling users to support frame relay and other traffic at T-1 speeds. The adapter will be available Dec. 17 for $2,400.

✆IBM: (914) 642-5357.

NETWORK CONSOLIDATION

Combining voice, fax with data reaps savings for remote users

BY JIM DUFFY

Simi Valley, Calif.

Large users have long employed T-1 multiplexers to build private nets that yield cost savings by supporting various types of voice, data and other traffic over a single backbone.

But what about remote sites that have similar needs but cannot cost-justify T-1 multiplexers and circuits? Do users have to rely on separate nets to support voice, local-area network, facsimile and terminal-to-host traffic to these sites?

The answer is no. There are products on the market today that allow users to meld voice and fax traffic with LAN and terminal data over the same digital lines for a substantial decrease in telecommunications costs.

Atlantic Security Bank (ASB) of Miami, for example, recently installed Advanced Compression Technology, Inc.'s ACTnet multiplexers to combine compressed voice and fax transmissions with terminal data and LAN traffic to achieve a 25% to 30% reduction in telecommunications costs.

The bank is shaving costs by eliminating long-distance telephone and fax charges between sites in Lima, Peru, Miami, New York and Panama City.

ASB's ACTnet network links Miami to New York over a 56K bit/sec terrestrial circuit while linking Lima and Panama City to Miami via two 64K bit/sec satellite links.

Funds-transfer and loan document data from Application System/400 hosts and personal computer LANs are combined by the ACTnet mux with digitized and compressed telephone and fax calls. The mux then translates that data into frame relay packets and routes it through the network to connected sites.

To carry voice over frame relay, the ACTnet boxes digitize and compress voice signals and map them into variable-length packets. Voice is given higher priority than data, and only data frames are discarded if congestion occurs.

Besides saving on telecommunications costs, the network enabled ASB to eliminate a processing center in Lima, transferring its functions to another data center in Panama. That consolidation is saving the bank $300,000 to $400,000 annually, according to John Partridge, ASB senior vice president and manager.

REAPING THE REWARDS

Another company reaping the financial benefits of a private voice/data/fax net is Lechmere, Inc., a Woburn, Mass.-based housewares chain. Lechmere is saving about $98,000 per year in telecommunications costs by combining voice and fax with data over a private network.

The Lechmere network initially consisted of four or five voice tie lines and one data line per store, all of which was costing the company more than $8,000 each month.

Lechmere added Micom Communications Corp.'s Marathon 5K muxes to its network to carry voice, data and fax traffic over 56K bit/sec lines between headquarters and remote stores in New York and Rhode Island.

David DeSisto, Lechmere's telecommunications manager, said of the Micom network, "It's done exactly what it's supposed to do." ◼

Apriori

Continued from page 11

crashes, Dean Wortham, manager of store support for JCPenney, uses Apriori GT to launch a search of the Apriori database for documentation that describes the problem and the solution scenario.

To retrieve the problem resolution information, a help desk attendant would launch Apriori GT's TexTracer application and use key word searches to track system configuration or historical symptom and problem resolution information. Once that information is gathered, the attendant can relay it to a store official over the phone or insert it in a trouble ticket and send it to the appropriate technician.

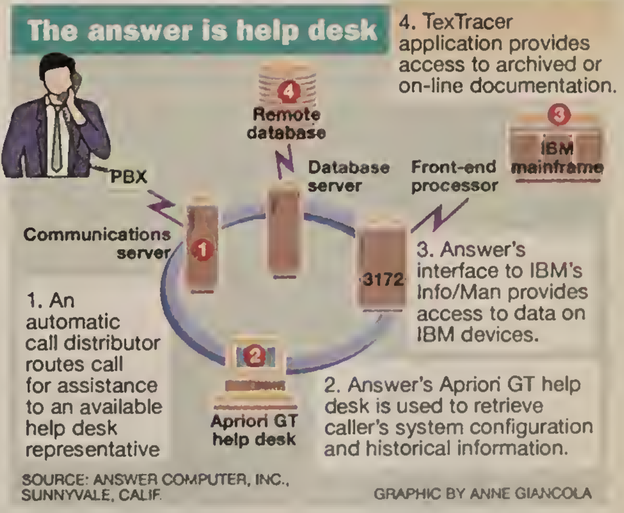
BellSouth Corp.'s Dataserv, Inc. subsidiary is trialing Apriori GT as a component of its POS help desk outsourcing services. Problems are resolved in much the same manner as at JCPenney: A previous record of symptoms and resolutions plus a profile on the customer's system configuration aids help desk attendants in troubleshooting.

Dataserv has found the grouping feature of Apriori GT particularly helpful.

"It allows you to track and notify groups of people based on what group they belong to," rather than individually, said Gary Columb, customer support manager for the BellSouth subsidiary.

Dataserv is also using the triggers capability to dispatch maintenance personnel to problem sites and to follow up on problems and their resolutions.

For instance, when a problem is received and personnel are dispatched to a site, an incident report is placed in an Apriori GT directory called a holding queue. After a user-defined period of time, a script file is launched to automatically retrieve the incident report from the holding queue and store it in another directory called a "follow-up queue." An attendant then knows to follow up on the incident and take any additional necessary action, Columb said.



4. TexTracer application provides access to archived or on-line documentation.

3. Answer's interface to IBM's Info/Man provides access to data on IBM devices.

1. An automatic call distributor routes call for assistance to an available help desk representative

2. Answer's Apriori GT help desk is used to retrieve caller's system configuration and historical information.

SOURCE: ANSWER COMPUTER, INC., SUNNYVALE, CALIF.
GRAPHIC BY ANNE GIANCOLA

Software developer CADRE Technologies, Inc. is using Apriori GT to coordinate and dispatch calls to help desk attendants. The company also uses TexTracer to locate and retrieve other sources of information to supplement problem resoultion documents created by help desk personnel, said Iva Poirer, director of technical support for CADRE.

The grouping facility allows CADRE to partition service by products or platforms. That enables certain groups to receive information about incidents that may only affect them, Poirer said.

Apriori GT will ship this week. Prices for the system start at $45,000.

✆Answer: (408) 739-6130.

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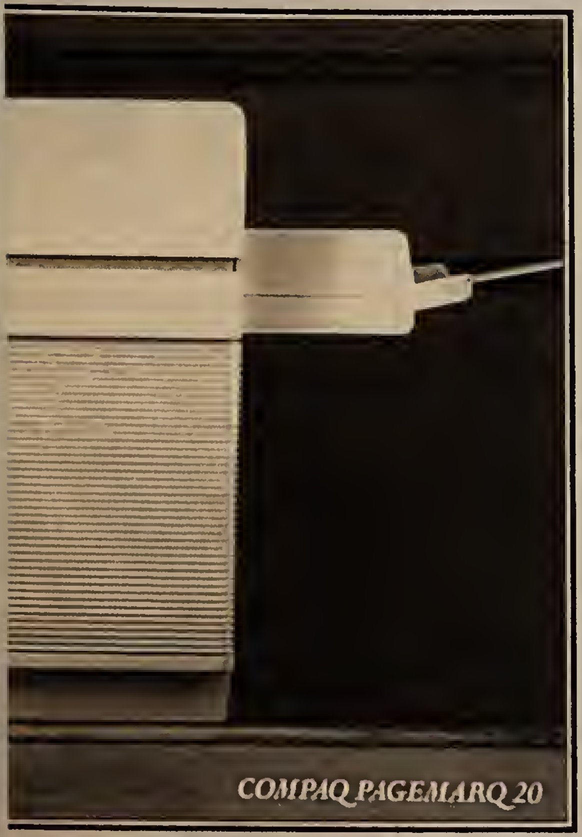

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Circle Reader Service #28

THE INTERNET

by Ed Krol

Accessing the Internet is child's play

I was the chairman for a session at the recent INTEROP in San Francisco titled Personal Connections to the Internet. During the session, four Internet service providers talked about how they link people who want Internet connections in their homes for nonbusiness reasons.

Some of the speakers made statements like, "We consider our clientele to be information-hungry professionals."

This was picked up by the audience, and during the question-and-answer period, someone referred to the statement, asking, "But when will Joe Six-Pack want the Internet?".

A month ago, I wouldn't have known how to answer that question. But I recently received two electronic mail messages that gave me some insight into the issue.

One E-mail started:

"Hello. My name is Susan Bonney, and I'm a 13-year-old from Massachusetts. My dad saved his copy of your article "Hunting for answers with gopher" from *Network World* (Aug. 16) for me to read. I'm interested in the Internet because of a wonderful science program I participated in this summer. The program provided me with an Internet account, which I am trying to use as often as I can."

She was interested in more information on the Internet scavenger hunt so she could do it regularly.

The other message was from an eighth grade student using a bulletin board system who asked if I knew where he could get a low-priced, full Internet connection in New York.

I was really touched by these two E-mails, which help counteract the dated myth that the Internet is difficult to use. If these kids can do it, why can't adults?

The only answer that makes sense is Internetphobia. Adults who tried to use the Internet as little as three years ago would have found the attempt fairly futile unless they were part of some group that supported them in their quest. So these people tried, failed and now tell their friends, "The Internet is much too difficult for me."

These kids have never known the old way and use a bunch of new and easier to use interfaces such as gopher. The adults need to stop making excuses and try again.

This explains why professionals who got frustrated don't use the net, but what do letters from 13-year-olds have to do with Joe? It implies that we are about half a generation away from the time when the Internet will be for everyone.

A small number of schools now have Internet access, but that number is growing quickly. Let's assume in five years that Internet access will be available to most 13-year-olds in school. Five years after that, those Internet-aware kids will be 18 and many will be entering the work force.

This doesn't mean that everyone will be wild Internet fanatics in 10 years. Rather, it means that everyone will have the skills necessary to use the Internet when they have graduated from high school.

What does this mean for Joe Six-Pack? If Joe comes home and just plops in the chair in front of the television with a brew, he is hopeless.

However, if he opens the newspaper at all, even if only to read the sports section, there's hope. Even if all he wants to know is the point spread for the Bears and Packers game, he is better off on-line.

Injury reports and the point spread for the games will change continuously. But because he will have been exposed to the Internet in school, so there will be nothing new to learn and no excuses. He may lose his shirt if he bets based on the information in the morning paper that's 12 hours old, while the person taking the bet is on-line.

➡ Krol is author of *The Whole Internet* (O'Reilly & Associates, Sebastopol, Calif., 1992) and assistant director for LAN deployment at the University of Illinois at Urbana-Champaign. He can be reached at e-krol@uiuc.edu.

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- Survey the key elements of Abstract Syntax Notation One (ASN.1), the language used to define SNMP message formats.
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- Learn how test equipment that supports the Remote Monitoring (RMON) MIB can assist with distributed LAN management.
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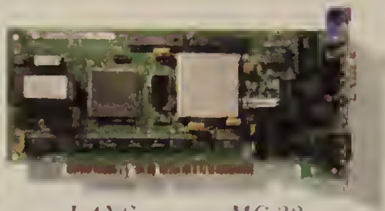
a) Token-Ring

Token-Ring 16/4 Adapter/A (MCA)


LANStreamer MC 32 Adapter

16/4 ISA 16 Adapter

LANStreamer MC 16 Adapter

16/4 Busmaster EISA Adapter

b) Ethernet

EtherStreamer MC 32 Adapter (10BaseT/2/5, full duplex mode)

LAN Adapter/A for Ethernet (10BaseT/2/5, MCA)

LAN Adapter for Ethernet TP (10BaseT, ISA)

LAN Adapter for Ethernet CX (10Base2, ISA)

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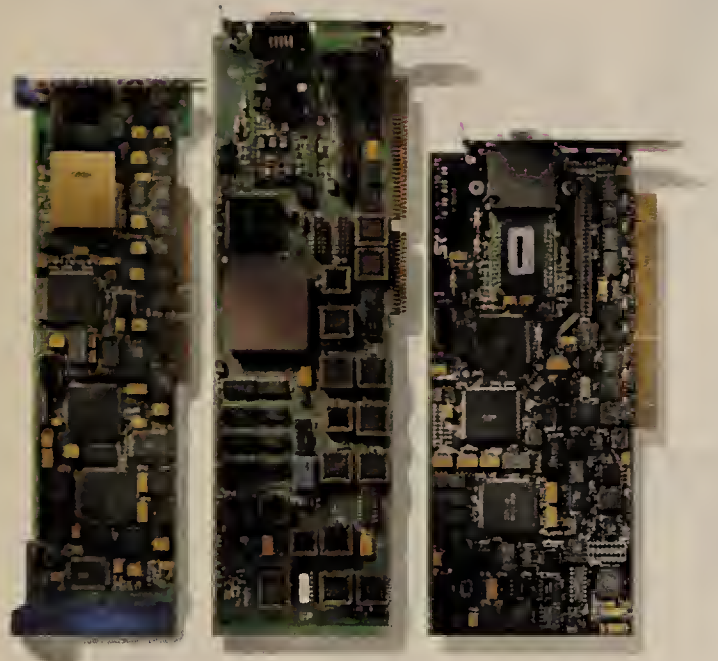

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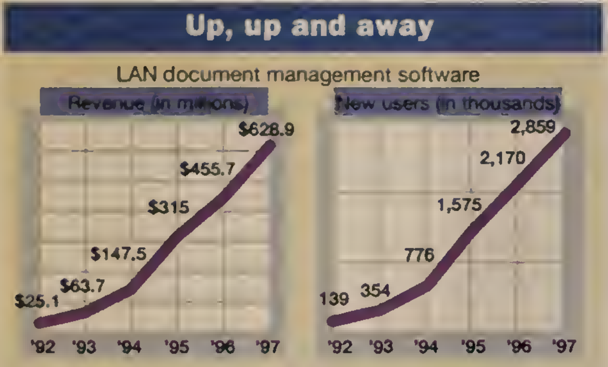

According to IDC, worldwide software revenues for work group LAN document management applications and the number of new users employing that technology are expected to grow at the same rate over the next 5 years.

SOURCE: INTERNATIONAL DATA CORP. (IDC), FRAMINGHAM, MASS.
GRAPHIC BY ANNE GIANCOLA

One step closer to achieving the paperless office

BY CARYN GILLOOLY AND SKIP MacASKILL

Paper. Reams and reams of paper.

For many companies, dealing with the ever-increasing number of documents and forms has become so unweildy that productivity and customer service levels are beginning to erode.

To control the flood of paper, some users are implementing local-area network-based imaging technology. Imaging allows users to scan forms, documents or any other type of paperwork, turning them into digital files that can be stored on magnetic media or compact discs. Users can access the documents over LANs, which eliminates paper shuffling and makes procedures such as order processing more efficient.

Five years ago, Carol Luongo, order processing supervisor at the Vacuum Products Division of Varian Associates in Lexington, Mass., was retreating in front of an avalanche of paper that threatened to grind her department to a halt.

''At that point, our goal was to reduce the number of file cabinets we had, which were growing at an alarming rate,'' she said. ''We process about 2,000 orders a month here for products that create, measure and control vacuum environments. Paperwork was piling up very quickly.''

> **"I went to my division manager and told him I wanted to go back to the paper files."**

Initially, Varian turned to a microfilm system, but Luongo discovered within months that a new answer was needed.

''We weren't on that system more than six months when we simply outgrew it,'' she said. ''We also found that files were in a black hole anywhere from four to six weeks [due to the film processing cycle].''

If problems or questions on an invoice came up during that time, one of Luongo's employees would have to search through boxes of paper waiting to be filmed or track down documentation that had already entered the microfilm process.

Besides tying up man power for extended periods, Luongo noticed the ability to provide timely customer service was suffering. ''That system was the bane of my existence,'' she said. ''I went to my division manager and told him I wanted to go back to the paper

See Paperless, *page L8*

Out of the box — NT Advanced Server

Not quite enterprise networking material, Windows NT Advanced Server is cost-effective.

BY MARK GIBBS

Although it didn't arrive with the fanfare of Windows NT, the Advanced Server version of the Microsoft Corp. network operating system deserves a closer look because it is targeted at large-scale networks.

While Windows NT offers built-in peer networking services, NT Advanced Server adds a network management feature called domains, centralized remote administration tools, several fault-tolerant features (including RAID 5 striping), remote access support and support for Apple Computer, Inc.'s Macintosh.

On the whole, Windows NT Advanced Server is impressive. Although built on the ruins of Microsoft's previous network operating system, LAN Manager, NT Advanced Server has a more mature look. It is based on a more sophisticated operating system (Windows NT) than LAN Manager (which used OS/2), and more effort has been put into system tools for monitoring and management.

But there are several issues on the downside. The first is the problem that NT Advanced Server, while aimed at the top end of the network operating system market, is not a pure file server system and much of the documentation makes the product sound like a peer networking system with ambition. At its recommended retail price of around $3,000, that would indeed be ambitious positioning. However, rumors are that Windows NT Advanced Server will have a street price of around $1,000 so the product may make it to desktops in just that role.

Second, the performance of NT Advanced Server has yet to be proven. Being a general purpose end user operating system hosting a network server subsystem, its raw throughput on a single processor system is unlikely to beat the performance of Novell, Inc.'s NetWare, though it may be comparable to Banyan Systems, Inc.'s VINES. NT

See Advanced Server, *page L6*

Crescendo extends support to HP's Apollo

BY SKIP MacASKILL

Sunnyvale, Calif.

Crescendo Communications, Inc. this week is expected to roll out a new line of adapters for Hewlett-Packard Co.'s Apollo 9000 Series 700 workstations that support Fiber Distributed Data Interface over both unshielded and shielded twisted-pair wiring as well as fiber-optic cable.

The new line of 32-bit network interface cards is based on Crescendo's Copper Distributed Data Interface (CDDI) technology, a standards-based approach for running FDDI traffic over copper wiring.

According to Jayshree Ullal, vice president of marketing, the adapters will enable HP users to get the maximum benefits from their high-performance workstations by allowing data to be exchanged with a hub at FDDI's 100M bit/sec rate.

The adapters for the Extended Industry Standard Architecture (EISA) buses found in the Apollo machines come in four versions, including single- and dual-attached models, the latter providing a second concentric ring for redundancy.

The single-attached adapters, which take up a single slot in the workstation, include the C320-HP CDDI EISA Adapter and the C321M-HP FDDI EISA Adapter.

The C320 provides FDDI connectivity at distances of 75 meters for Category 4 unshielded twisted-pair wiring or 100 meters for Category 5 unshielded twisted-pair wiring and IBM Type 1 and 2 shielded

See Crescendo, *page L11*

BRIEFS

Network General Corp. and **3Com Corp.** have signed a joint technology and marketing agreement under which users of 3Com's Star-Tek Network Management software for the LinkBuilder Focus and TR series of token-ring intelligent hubs can forward Remote Monitoring information to Network General's Sniffer analyzer for protocol decoding and packet analysis.

Network General: (415) 473-2000; 3Com (800) 638-3266.

Novell, Inc. has yet another security patch, this time for its NetWare 4.X line. According to the company, with current versions of 4.0 and 4.01 running in a DOS environment, the logon utility allows a user's name and password to be swapped to disk, thereby vulnerable to future break-ins.

Users can get the new file, called LOGIN.EXE v4.02, by calling Novell at (800) 638-9273.

The fix is also available at no charge through NetWare resellers and on NetWire in Library 14 of the NOVLIB forum as SECLOG.EXE.

Artisoft, Inc. recently upgraded its Central Station LAN connectivity processor to improve management and add more versatility. Central Station is a hardware/software product that attaches to a LANtastic or Novell, Inc. NetWare local-area network and provides print server and remote dial-in capabilities.

The Central Station II lets administrators reconfigure the product from any workstation on the network. Previously, net managers had to attach a laptop directly to the Central Station to reconfigure ports or change parameters.

Central Station II also now allows for two remote connections and one local connection. Central Station II is available now for $595.

Artisoft: (800) 846-9726.

Emulex Corp. has rolled out Version 2.3 of its communications server software that supports the Point-to-Point Protocol and Simple Network Management Protocol Enterprise Management Information Base. It also offers an enhanced protocol translation gateway feature that allows users of Local Area Transport and Transmission Control Protocol/Internet Protocol to make terminal connections between those two protocols.

Emulex: (800) 854-7112.

Peer-to-peer LAN makers attack new market segments

Offer options for small shops, traditional LAN users.

BY CHRISTINE BURNS

Peer-to-peer networking is going to extremes.

The traditional peer-to-peer network user is a small business looking to connect 10 to 25 personal computers to share applications, printers and hard disk drives.

But analysts and leading vendors like Artisoft, Inc., Novell, Inc. and Microsoft Corp. say peer networking is spreading to even smaller businesses – such as home offices – and to the opposite extreme, larger organizations where dedicated server networks are already being used.

Peer network providers will attack the very low end with new products designed to connect five or fewer PCs. At the higher end, peer networking capabilities are being integrated into the desktop operating systems of PCs already linked to traditional local-area networks. This will enable users to communicate with one another directly for many tasks and reduce the strain on the server.

STARTING SMALL

Artisoft is trying to hold its top spot in the traditional peer-to-peer market by adding support to its mainstay LANtastic product for services such as electronic mail, scheduling, and modem and facsimile capabilities. However, the company is also working on a scaled-down LANtastic. This new entry-level version will be easy to install for customers wanting to connect five or fewer PCs, and it will sport a graphical user interface to help end users access network resources.

"Segmenting the network market and making sure low-end, peer-to-peer users have a migration path to larger nets is what we're talking about," said William Keiper, chairman and chief executive officer of Artisoft, headquartered in Tucson, Ariz. "Users may start with six to 10 nodes on a network, but they don't want to give up the option of moving that to a 60- to 100-node net."

Today, Artisoft and Novell have a tight grip on the traditional peer-to-peer market. In 1992, Artisoft held a 46% share of the world-wide peer-to-peer market, according to figures from International Data Corp., a Framingham, Mass.-based research firm. The same study showed Novell, with its NetWare Lite, holding a 25% market share. Microsoft's Windows for Workgroups, only a year old at the time, garnered around 4%.

According to Keiper, Artisoft's upcoming low-end product, expected to ship early next year, will not support connectivity to other types of networks, such as Novell's NetWare, or include any advanced group collaboration capabilities. But, he said, it will be easily upgradable to the full-blown NetWare 4.0 product.

Another peer-to-peer supplier, CBIS, Inc. of Norcross, Ga., is planning to announce a similar product in October. "We're going after people who have never even thought about networking their PCs or who are afraid of the headaches of doing that," said John Scott, marketing director at CBIS.

The low-end CBIS product, called Desk-to-Desk, will offer users the same functionality of CBIS' Network OS, including an option to migrate to a larger peer net supporting up to 255 nodes, ties to NetWare and a dedicated server option. Scott said Desk-to-Desk is geared to the low-end market because it offers a simple installation and configuration program. "Any novice can hook PCs together with this thing," he said.

HITTING THE HIGH NOTES

With a peer-to-peer net, users can forgo the cost of buying and the headaches of installing a dedicated file server. But the price for having PCs communicate directly may be higher security risks and more management problems. What is more, analysts say, performance can drop as more peer nodes are added to the network.

JOHN THOMPSON

William Keiper of Artisoft.

John Faig, a senior research analyst at the META Group, a Westport, Conn.-based consultancy, said peer network providers are trying to address these security and management issues in their quest to establish peer-to-peer technology as a viable alternative to server-based LANs. But at the same time, the boundaries between peer and traditional LANs are blurring as desktop operating systems incorporate a variety of new communications capabilities.

"What you're going to see down the line is a hybrid of dedicated server and peer-to-peer networks," Faig said.

Suppliers of desktop operating systems are putting in networking capabilities that let users communicate on a peer level for simple messaging or file sharing within small work groups. Those users can also rely on a server-based system for other capabilities, including secure storage and centralized network management.

"There is no reason why the message I want to send to you has to go through a server. That's a wasted step," Faig said.

Jodi Mardesich, an analyst with The Burton Group in San Francisco, said many desktop operating systems already offer peer connectivity. "Unix does it. Macintosh does it. And now most of the companies making DOS and Windows operating systems are leaning torward integrated peer services in the desktop," she said.

Two examples of this are Microsoft's Windows for Workgroups and IBM's DOS Version 6.1, which was released in June and supports peer-to-peer features.

Rogers Weed, product manager for Windows for Workgroups, is positioning that product to be the desktop operating system of choice in a networked environment, rather than a typical peer-to-peer network operating system. "Analysts are saying that peer-to-peer functionality is moving toward the desktop. We're already there," Weed said.

The development of an enhanced version of Windows for Workgroups, which Weed referred to as "Snowball," is due out by year end.

Mardesich said Windows for Workgroups is limited in providing peer functionality within a dedicated server environment because it supports only Windows clients. She added that Novell's NetWare Lite may be a more likely candidate to connect PCs as peers in a server-based environment because it supports both Windows and DOS machines.

Novell offers some peer capabilities at the desktop level with its Novell DOS 7.0 operating system and has indicated that a future product, Personal NetWare, will offer significant networking features and support for DOS, Windows, Unix, IBM OS/2 and Macintosh machines.

Willie Donahoo, vice president of Novell's desktop systems group, denied that Personal NetWare evolved in response to users requesting peer-to-peer capabilities in NetWare client/server environments. "Personal NetWare came out of people questioning Novell's committment to networking at the low end, the desktop," he said.

Symantec to offer LAN administration tools

BY CHRISTINE BURNS

Cupertino, Calif.

Symantec Corp. will break into the network arena this week with the announcement of the Norton Administrator for Networks 1.0, a set of LAN administration tools that keeps track of system inventory, handles software distribution and monitors software licenses for programs on the net.

"The cost of having your administrator running around to each machine to see what you actually own, or going from PC to PC to install software manually is time-consuming and very expensive," said Peter Tippett, director of security and enterprise products at Symantec.

Norton Administrator for Networks 1.0 minimizes both the legwork and the cost involved with system inventory, software distribution and license monitoring, he said.

The Norton Administrator for Networks 1.0, developed by the Peter Norton Group, a division of Symantec, contains three components, all of which are controlled via a graphical user interface.

The first component provides automated installation of software on network nodes. Using this tool, administrators can target workstations to be updated. The distribution jobs are executed by DOS or Windows agents residing on the workstations that poll the server to check for distribution jobs.

The second piece keeps track of hardware and software on the net. Inventory information is gathered via an executable installed on each PC using the software distribution tool that outlines all hardware and software components used at a particular workstation.

This data is then stored in a central database located on the server. Hardware inventory is gathered in 22 categories, including CPU type, speed, bus type, ports and network adapter card types. The software inventory lists system files, more than 1,500 commercial applications and customized applications.

The third element lets an administrator either monitor application usage or enforce a program license by setting limits on the number of users.

Utilizing the software distribution component, administrators can install a terminate-and-stay-resident (TSR) program or a Windows agent on each workstation to control applications, whether they were lauched from the server or the workstation.

The Norton Administrator for Networks 1.0 functions independently of the network operating system and provides plug-and-play connectivity with other Symantec products, such as Norton AntiVirus workstation offerings and pcAnywhere remote control software, providing monitoring functions for those products.

The Norton Administrator for Networks 1.0 is available now and ranges in price from $65 per node for five licenses to $44 per node for 1,000 licenses.

In a separate announcement, Symantec will release an antivirus product, which runs on Novell, Inc. NetWare file servers and checks files stored on the server for known and unknown viruses.

The Norton AntiVirus for NetWare is a NetWare Loadable Module (NLM) for NetWare 3.X or 4.X environments that scans DOS, Windows and Macintosh files on the network for more than 2,000 known virus signatures as well as unknown virus activity.

System administrators can control Norton AntiVirus for NetWare from any workstation and can define how frequently the files on the server are scanned for viruses, how they are notified when a virus is found and what action is taken in that case.

The NLM scans all files as they are stored to and accessed from the server. In addition, any Symantec stand-alone antivirus workstation-based product can tie into the Norton AntiVirus for NetWare, letting the system manager monitor all network antivirus activity from a central console.

The Norton AntiVirus for NetWare is available now and costs $995 per server.

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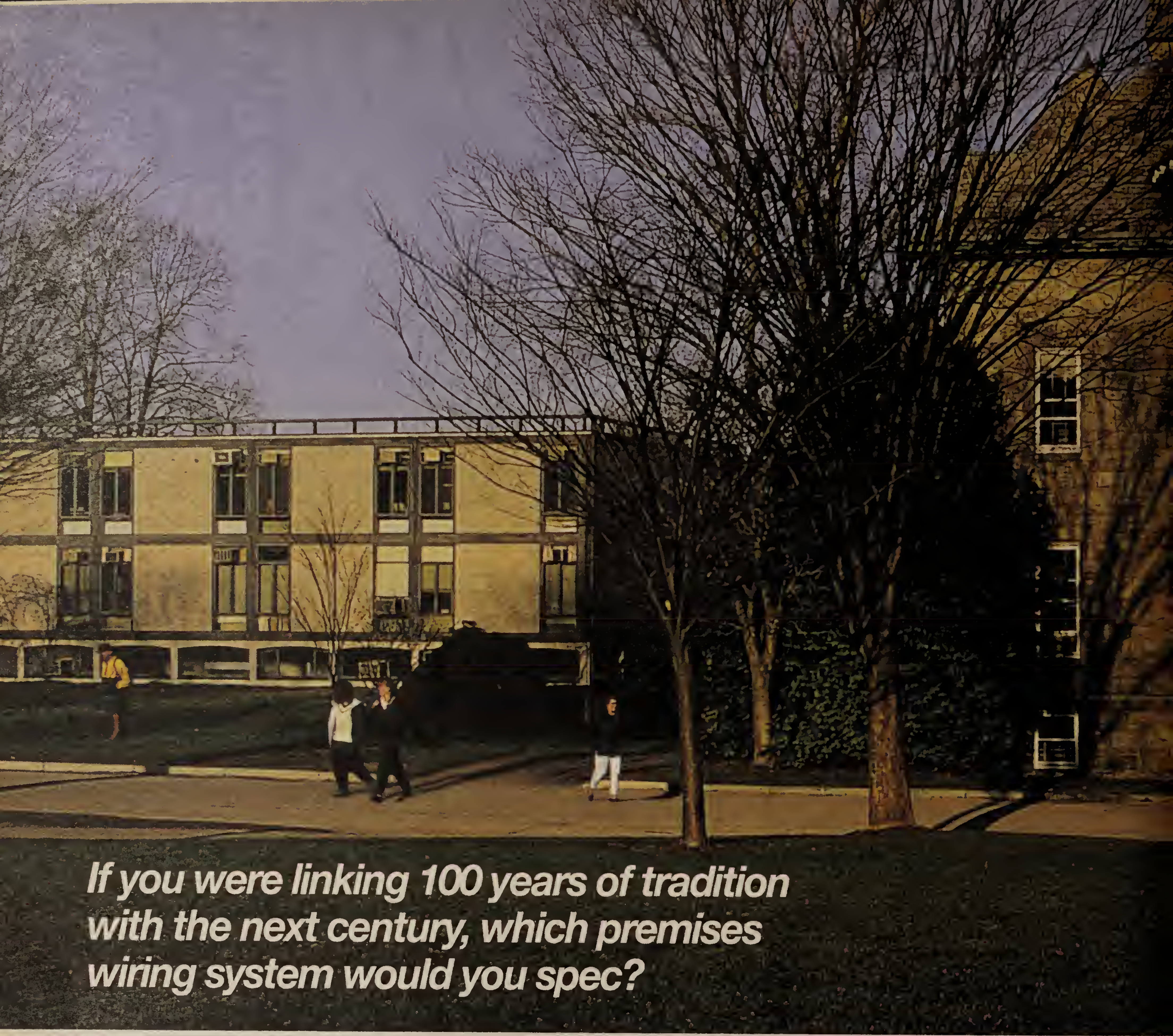

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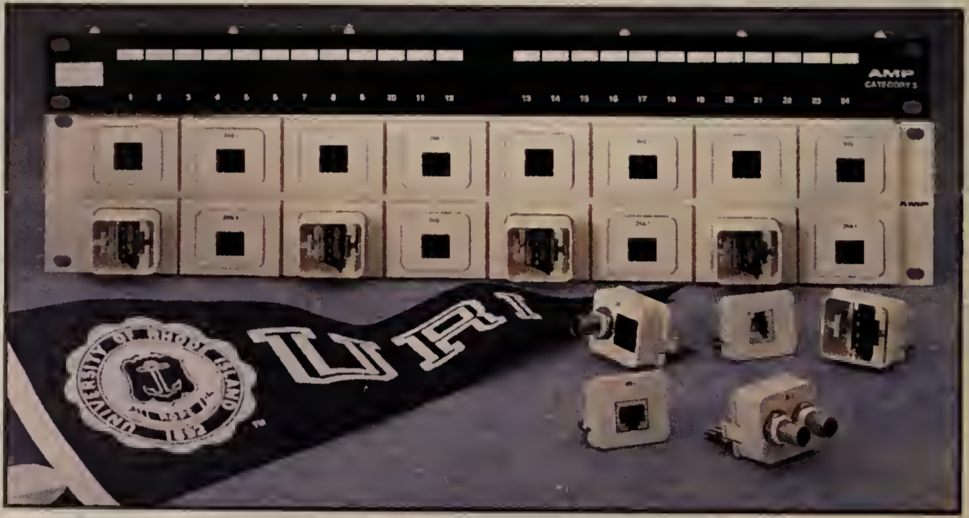

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No surprise, then, that when they reviewed their networking environment five years ago, they set their sights firmly on the next century.

Today, URI runs TCP/IP Ethernet on an FDDI-ready, campus-wide fiber backbone. Remote campuses are linked in, and the school is seeing its plan take shape. Key in that plan is a premises wiring system from AMP — the NETCONNECT Open Wiring System.

To provide cabling with a future, the University specifies horizontal wiring that includes two Level 5 UTP cables for data and one Level 3 UTP cable for voice at each station. And, with an eye on emerging technologies such as ATM, the current spec asks for a two-pair STP cable in the mix.

At the user end, wiring is terminated permanently to four-port AMP Communications Outlets, where changes can be accomplished with a simple insert exchange. Inserts match equipment to the installed cable, and provide the correct connector. Just as importantly for URI, the inserts provide an upgrade path to higher-performance Category 5 levels.

Where room allows, wiring at the closet goes to matching outlets in patch panels. In tight spots, NETCONNECT 110Connect panels are used, with punch-down termination on the back and a printed circuit board interface to RJ45 connectors up front. The pcb interface guarantees consistent impedance and crosstalk control, required by newer technologies.

Their wiring specification gives URI maximum room to grow, and their AMP NETCONNECT system gives them the ability to take maximum advantage of that wiring, now and in the future.

For more information about the AMP NETCONNECT Open Wiring System, call 1-800-522-6752 (fax 717-986-7575). AMP Incorporated, Harrisburg, PA 17105-3608. In Canada, call 416-475-6222.

THIS IS AMP TODAY.

AMP

Circle Reader Service #10

Advanced Server

Continued from page L1

Advanced Server can use symmetric multiprocessing and is being implemented on RISC systems and the DEC Alpha, but those implementations still place it at roughly the same price/performance point.

Third, the lack of a real global directory service makes it much less appropriate for organizations that want to build an integrated enterprise network environment.

Microsoft has been positioning NT Advanced Server as a "NetWare killer," but in its current release, it is unlikely to drag enterprise net users away from NetWare 4.0 and VINES with StreetTalk or even NetWare 3.11 with Banyan's ENS.

For smaller systems, NT Advanced Server may well gain a very significant market share. It is simple to set up and definitely network manager-friendly when it comes to control and management.

OUT OF THE SHRINK-WRAP

The first thing that strikes you about the NT Advanced Server is how few manuals there are. Indeed, the entire product comes in one small box containing the documentation (just under 3 1/2 inches thick), 24 3 1/2-in. disks, two 5 1/4-in. disks, one CDROM and one videotape. The video describing the product is rather self-serving but useful nonetheless.

Compare the manuals to Novell's NetWare, which has roughly 8 1/2 inches of documentation (the minimum printed set; the rest is stored electronically) and Banyan VINES' manuals, which stack up to well over 1 foot at the minimum.

This is impressive and indicates just how much Microsoft has simplified the system.

To help you select a platform and peripherals, Microsoft supplies a slim manual called the Hardware Compatibility List. This covers such things as compatible personal computers, Small Computer System Interface (SCSI) host adapters, CDROM drives, tape devices and uninterruptable power supplies that have passed compatibility testing.

For the PC, you can select from a wide range of uniprocessor systems based on the Intel X86 architecture, a small range of X86 multiprocessor systems and an even smaller list of Reduced Instruction Set Computing (RISC) systems based on the MIPS Technologies, Inc. R/4000 processor.

For both the X86- and RISC-based systems, a whopping 16M bytes of random-access memory is the minimum required (compare this with 8M bytes for both NetWare and VINES). Rumor has it that at least 20M bytes is needed if you require high performance. Considering the current cost of RAM, this issue alone may well slow the product's acceptance.

Disk use of NT Advanced Server is also verging on the greedy: 90M bytes is the minimum for X86, and 110M bytes for RISC systems. This compares to about 70M bytes for NetWare 4.0 and the same for VINES 5.5.

CONNECTIVITY SUPPORT

Windows NT Advanced Server is feature-rich in the area of net support. It offers the proprietary Network Basic I/O System Extended User Interface (NETBEUI) protocol for LAN access and Transmission Control Protocol/Internet Protocol for wide-area access as well as Data Link Control for IBM mainframe connections, and support for connections to NetWare and VINES servers. All of the most common network adapter cards are supported.

Windows NT Advanced Server supports DOS, OS/2, Windows, Windows NT and Macintosh clients. Application communications support is provided using such standards as remote procedure call (RPC), NETBIOS and Portable Operating System Interface.

Another new feature in NT Advanced Server is the Remote Access Server, which allows as many as 64 users to connect to the server by dial-in connections. Almost everything that the user can do locally on the network can be done remotely through RAS. This includes accessing file and print services, SQL database access and 3270 emulation.

OF SECURITY AND DOMAINS

NT Advanced Server incorporates new features as well as some that are inherited from other Microsoft products.

The new optional file system is targeted at improving security. Microsoft's existing file systems, the DOS file allocation table (FAT) and the High Performance File System (an option under OS/2), are both available on NT Advanced Server, as is the New Technology File System (NTFS).

This new file system is more sophisticated than the other two, providing extensive security, long file names (255 characters, including spaces) and event auditing. NTFS also provides support for DOS programs and clients by automatically building a FAT-compatible file name. The security features of NT Advanced Server are built on organizational models, some of which were available in LAN Manager. Microsoft wisely threw out resource-level security and has kept and enhanced user-level security.

At the user level, all of the features required for serious user control are supported — password controls, account expiration, logon times and days, logon locations and so on. Microsoft

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has grouped many of these parameters for user and service security into "policies," a nice concept for structuring control.

Groups of servers form what are called domains, which share a common database of user account information. Whenever a change occurs in a user account, the modifications are replicated to other servers in the domain, which vastly simplifies management. For users, logging on to the system can validate you for all servers in a domain, effectively providing a single logon.

To make administration easier, NT Advanced Server has extended domains from the model used by LAN Manager by adding the idea of trusted relationships between the domains.

At logon, a user is validated by their "home" domain by correctly entering their name, password and home domain name. Whenever the user tries to access a net resource on another domain that "trusts" their home domain, the domain being accessed asks the home domain to vouch for the user. When a trust relationship hasn't been defined between domains, they are isolated from one another.

The NT Advanced Server domain system is not, however, a true global directory service. For example, it lacks the ability to attach data such as phone numbers or physical location to accounts, and account names have no convention that allows for hierarchical naming. This prevents the directory from acting as a repository of organizational data that is structured to mirror the company, a crucial and strategic issue in enterprise networking.

In any distributed computing environment, particularly where replication of data is involved, fault tolerance is a fundamental need. NT Advanced Server supports two fault-tolerant features for hard drives. Disk mirroring, RAID 1, allows two drives to mirror each other. Whatever data is written to the primary drive is copied to the secondary drive.

If a fault such as a bad sector occurs, the sector is mapped out and the data is recovered from the secondary drive. In the case of a complete primary drive failure, the system automatically switches to the secondary drive.

NT Advanced Server's alternative to RAID 1 disk drive fault tolerance is RAID 5, striping with parity. Requiring at least three physical disk drives, data and parity information is stored across all of the drives. If a drive fails, the other drives have enough information to allow work to continue while the failed drive is repaired or replaced.

EXPORTING DIRECTORIES

An interesting feature of NT Advanced Server is the Replicator service. Specified subdirectories and their files, which are under a subdirectory called Export on the server, can be copied automatically to a subdirectory called Import on any Windows NT workstation or Windows NT Advanced Server.

The administrator can specify which computers or domains can receive the exported subdirectories, and the importing computers can specify which servers they want to import from.

When a change occurs in the exported subdirectories or files, it is replicated to all copies. The Replicator service can be set to replicate changes immediately or wait for two minutes after changes before replicating. Users can also lock subdirectories so changes aren't exported until they complete an operation.

This allows loads caused by access to common files to be spread across multiple computers. The primary use for this service is to replicate user logon scripts and configuration profiles between multiple servers in a domain so all servers can validate and logon all users.

THE FUTURE

Without doubt, NT Advanced Server is impressive. It has sound technical and architectural footings, well-featured services and a lot of facilities that make control and management easier. Its pricing is interesting as it offers unlimited users and bundled Macintosh support in one package for $2,995. For 100 users that works out to roughly $30 per seat.

The equivalent services using NetWare would cost around $70 without Macintosh support. With Macintosh support, the cost rises to about $90.

For medium and large work groups, NT Advanced Server is a powerful choice, but when enterprise networking is being considered, it's unlikely to fit the bill.

At its first release, it's wise to treat the system with caution — is it stable, is it robust, can it perform, can it scale? These are all crucial questions.

Unless NT Advanced Server has some surprise advantages that haven't been revealed yet, or Microsoft has a killer upgrade to the product waiting in the wings, the enterprise networking market will belong to VINES and NetWare for some time.

➡ Gibbs is a writer and consultant based in Ventura, Calif. He can be contacted at (805) 647-2307 or via the Internet at mgibbs@rain.org. His books, *The Absolute Beginner's Guide to Networking*, (Sams Publishing) and *Navigating the Internet* (Sams Publishing) are available now.

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Circle Reader Service #15

Bausch & Lomb arms its sales force with access to information

BY DANA THORAT

David Phillips wants to send his troops into battle fully armed.

Phillips, sales technology manager at Bausch & Lomb's Rochester, N.Y., division, is in the midst of an effort to fully automate the sales force of the company's Personal Products Division.

The company implemented the first phase of that project 18 months ago, giving a large staff of mobile users dial in access to the company's Novell, Inc. NetWare local-area network.

"It was tough to sell the concept of automation to upper management," Phillips said. "But after the huge success with remote networking, management has given the nod for the full automation project."

The idea to automate the sales force cropped up as a way to answer continuous requests from marketing and other Bausch & Lomb departments for sales reports from representatives in the field. It triggered a search for a way to have sales force members to submit reports without intervention or help from Phillips' group.

Bausch & Lomb's first step was to outfit each of the 45 salesmen with a Toshiba America Information Systems, Inc. laptop and modem. The laptops, which run the same application software as the LAN, allow the salespeople to communicate via electronic mail, receive forecasting data and promotion plans and upload call reports and monthly status reports.

They achieve this by dialing in from home, hotels, airports and customer sites and taking control of a personal computer on the LAN using Microcom, Inc.'s Carbon Copy. The program sends screens back and forth over the phone line, although programs are actually executed on the LAN-attached PC, not on the remote PC.

To copy data from the LAN to the laptop and send it back, the sales force uses Microcom's CC:DOS, a program with commands similar to MS-DOS, Phillips said.

H. BOUWENS

PHILLIPS

THE NEXT STEP

While this environment helped Bausch & Lomb respond faster to business opportunities and customer needs, disseminate information quicker and smooth day-to-day operations, it was less than perfect.

For one, "Using CC:DOS was difficult," Phillips said. "There was no flexibility. We could only do what CC:DOS commands would allow us to do. We just couldn't make it simple for the user." In addition, users grumbled about having to learn new commands and file-transfer operations.

Phillips came to realize that what he needed was a remote access solution in which the remote computer resembles a local node on the LAN and users see and use the network exactly as they would if they were in the office.

To find such a solution, Phillips called on the services of independent consultant Jonathan Witmer, who studied several remote access options.

One product evaluated was Novell's Access Server. But after Witmer discussed the company's requirements with Novell, the vendor actually recommended against using the product. The Novell Access Server requires a dedicated PC, two modems and runs under Desqview multitasking software.

"It was slow and also a waste of resources," Witmer said.

Witmer also read reviews about Novell's Access Server that warned of performance degradation when more than a few users dial in and need to share the same host computer. "We just can't have that when 40 users are sending in their reports on a Friday night," he said.

Witmer also ruled out Digital Communications Associates, Inc.'s Remote LAN Node (RLN) because it requires a dedicated PC to act as the

See **Information**, *page L13*

Paperless

Continued from page L1

files, but he told me that was unacceptable and I had to find an alternative."

At that point, imaging technology was just coming to the forefront, so Varian put together a task force to compile a list of minimum requirements that an imaging system would have to meet. Those requirements included: quick turnaround time; accessibility to documents by multiple users via the existing Novell, Inc. NetWare LAN; no new hardware purchases, except for the components for the system itself; the ability to send facsimiles directly from the personal computers; and, most importantly, it had to be upgradable.

"We wanted to make sure the new system was scalable and could grow as new technology developed and our needs changed," Luongo said.

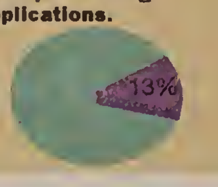
The Varian system includes a Wang Laboratories, Inc. SC3000 scanner and a Wang jukebox that holds as many as 50 disks.

A Wang Powerstation, which consists of a Dell Computer Corp. 3330D workstation and Wang 1940 monitor, is connected to the scanner and handles the image management duties, interfacing with the 15 active clients on the imaging net.

Since Varian was relatively new to the concept of networking, the company ran into some initial problems getting all the components to work together.

Luongo also discovered that a nagging but livable network performance problem was made all the more evident when the imaging system was put in place. So Varian ended up purchasing a second file server specifically for the imaging system to bring response times in line.

According to a recent survey by Dataquest, Inc., 13% of the 300 network managers contacted said image transfer was one of the emerging applications they would be considering within the next 24 months, placing it fourth behind database access, electronic mail and word processing applications.



PAYS FOR ITSELF

But the early frustration was apparently well worth it since it changed the way Varian does business, according to Luongo. "We went from having 65 file cabinets to none," she said. "We stopped losing files, which was a chronic problem with the old system, and it made us much more customer responsive."

The biggest benefit has been a financial one. With an initial outlay of approximately $120,000, the system has already paid for itself in less than two years. According to Luongo, paper costs alone have gone down some $25,000 per year since the system has been in place. Copying costs and stationery expenses have also declined, and Luongo has reduced the department's staff by two people.

"It's not an inexpensive solution, so you have to be careful when selecting it," she said. "You should make sure the system is scalable so it can grow with you and that it's not going to require huge changes in your existing system."

MAKING IMAGE DEPOSITS

That advice is echoed by Richard Hieb, executive vice president and chief administrative officer of Western Bank in Medford, Ore. The bank is in the midst of installing NCR Corp.'s Document Management System (DMS), which uses software from Intelus Corp.

"There are so many vendors out there now that offer these systems, one wonders if they all have the staying power to survive," Hieb said. "My advice would be to choose a player that you believe is going to be around in the long term. You're entrusting the core of your business to the system, so you need to make sure help will be there when you need it."

When Hieb saw that it was taking the bank 40 days to close a real estate loan, he decided there had to be a better way to handle the process.

"While paper management is the first benefit that leaps to mind when imaging is mentioned, we were actually more interested in installing a system that would allow several users to work on a project simultaneously," Hieb said.

The bank's DMS package includes an NCR 3445 server, which will house the DMS image database, 16 image-retrieval workstations, a fax server, a high-speed printer and a scan station. Intelus will provide the document management software that runs on the workstations.

The DMS will initially be employed at the bank's central real estate loan location. That department handles between $6 million and $7 million worth of loans each month, which translates roughly into 100 processed loans and about 25,000 documents every 30 days.

"I'm not expecting massive reductions in personnel costs," Hieb said. "I'm looking to at least double the volume of the department without incurring a lot of increases in human resources. We also want to [improve] customer service by generating quicker turnaround times for loan processing."

PAPER Rx

While Luongo and Hieb had to deal with tremendous paper loads before turning to imaging, their paperwork problems pale in comparison to the amount of documentation an average hospital must deal with on a daily basis.

One hospital administrator, who requested anonymity, said he was wrestling with an almost insurmountable paperwork problem and finally decided to install an imaging system to ensure timely delivery of patient information to physicians.

"Before we put in our imaging system, everything was paper driven, so if a doctor wanted a record, a file clerk was dispatched to the record room to retrieve it," the administrator said. "At one point, we did a medical study that compared information from different patients' records, which took eight months to complete. Now, doing that study would be a matter of a simple query."

The hospital's imaging system has about 95 active users and covers a number of areas in the hospital, including medical records, general services, billing, and the administrative and nursing departments.

"Before the imaging system, when we sent out patient bills, there were about 15 pages of charts and other information that had to be collated into a single form," the administrator said. "We had five people doing this for about two hours every morning. Now, it's all done automatically, overnight."

Like Luongo, the hospital expects the system to actually pay for itself in less than two years.

"We made a $2.65 million investment in putting in the system, and we expect to see full payback in just over a year and a half," the administrator said. "It's almost too good to be true." ◼

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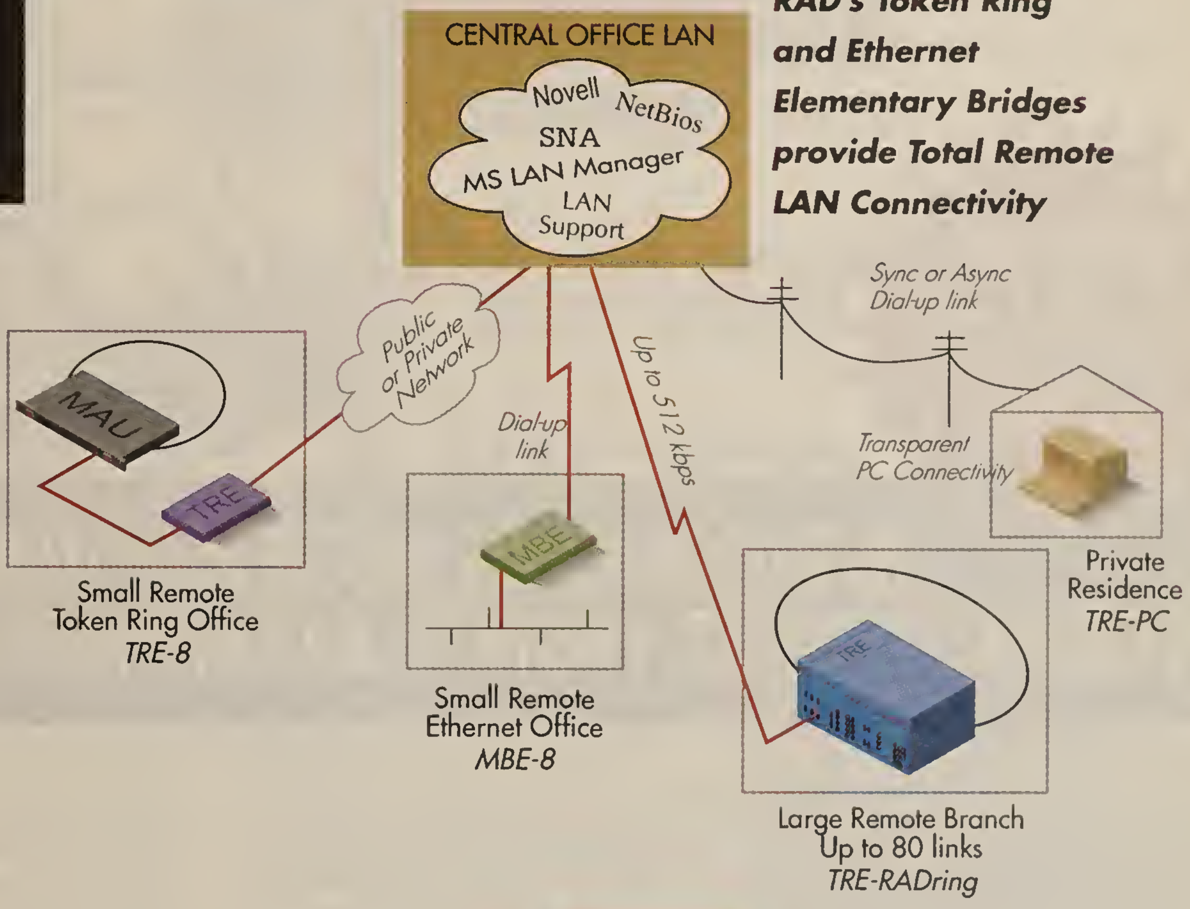

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Circle Reader Service #18

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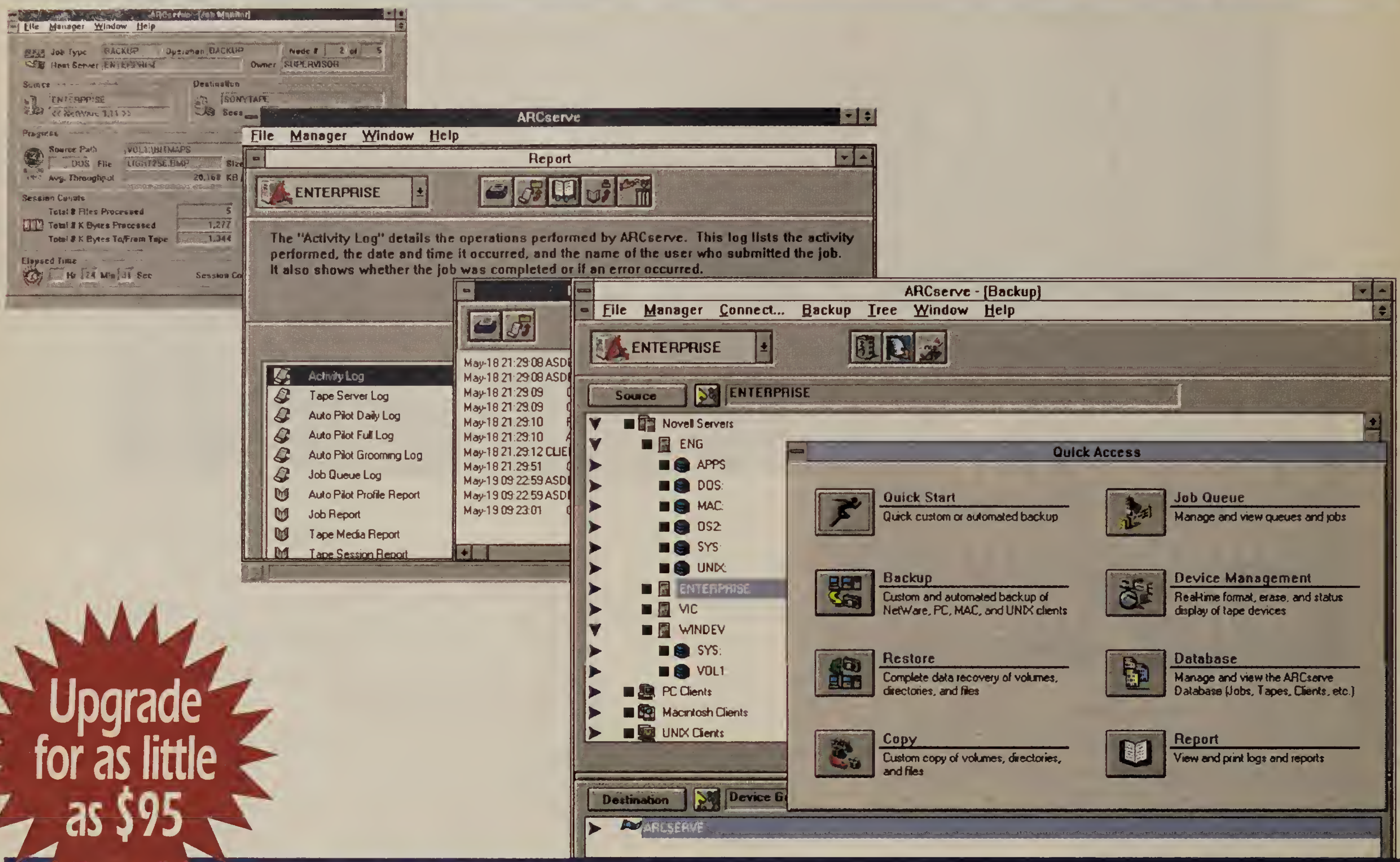

The "Activity Log" details the operations performed by ARCserve. This log lists the activity performed, the date and time it occurred, and the name of the user who submitted the job. It also shows whether the job was completed or if an error occurred.

```
May-18 21:29:08 ASD
May-18 21:29:08 ASD
May-18 21:29:09
May-18 21:29:09
May-18 21:29:10
May-18 21:29:10
May-18 21:29:12 CLIE
May-18 21:29:51
May-19 09:22:59 ASD
May-19 09:22:59 ASD
May-19 09:23:01
```

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Circle Reader Service #16

Uninet Global Networking to deliver data/fax server

BY CHRISTINE BURNS

Oak Brook, Ill.

Uninet Global Networking Corp. this week will announce an integrated data/fax server that lets users running DOS or Windows send and receive facsimiles, initiate data communications sessions and support remote clients.

The new Datafax server, which will begin shipping at the end of the month, runs on either Ethernet or token-ring networks, uses existing telephone lines and supports as many as 40 data communications users and 32 facsimile users.

David Henigan, president of Uninet, said Datafax's stength is in its integrated approach. Customers usually have to buy fax boards and data boards, get a modem, find software and put the system together piecemeal.

"[It] is a ready-to-use turnkey system that has all these things in one dedicated unit," Henigan said.

Datafax supports concurrent inbound and outbound data communications and fax transmissions.

Faxes can be sent directly from either DOS or Windows applications, or the server can be set up to fax jobs at a specific time or when telephone rates are the lowest. The device allows phone directories to contain a maximum of 65,000 entries.

Inbound faxes are routed directly by the Datafax server to the intended workstation using existing direct-inward dialing, in which the server associates the number dialed with a specific end user, or dual-tone multifrequency push-button systems, in which the user is asked to route the document by keying in instructions. This ensures that faxes are received only by the users for which they were intended.

For data communications, Datafax supports modem speeds up to 57.6K bit/sec and protocols such as XModem, YModem/G and ZModem. It is compatible with more than two dozen modem and software packages, including Lotus Development Corp.'s cc:Mail, Symantec Corp.'s PC Anywhere and all versions of Novell, Inc. NetWare and other network operating systems that support the Network Basic I/O System.

Remote users that want to dial in to a local-area network via Datafax are supported in one of two ways.

The first is to give the remote node direct, transparent access to all the network resources via a dial-in connection. While this provides convenient access to the net, many LAN applications may not be suitable for dial-up access. The second means of remote connectivity requires that at least one personal computer attached to the LAN act as a host for the remote user.

Datafax ranges in price from $6,000 to $50,000, depending on the number of lines supported.

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Crescendo

Continued from page L1

twisted-pair cabling. It is available now and costs $1,495.

The C321M offers similar connectivity over multimode fiber-optic links. It can support distances of up to two kilometers and is also available now. It costs $1,995.

The dual-attached adapters, which require two slots in the workstation, include the C325 CDDI EISA Dual-attach Option and the C316M FDDI EISA Dual-attach Option. Both are available now and cost $695 and $1,395, respectively.

The new cards support Version 6.2 of the Station Management protocol, which helps users monitor, configure and manage FDDI's dual-ring architecture, as well as a flash erasable programmable read-only memory feature that allows all software upgrades to be downloaded remotely.

The new adapters can be used with drivers meeting Microsoft Corp.'s Network Driver Interface Specification on Microsoft LAN Manager or Windows NT clients and servers; Novell, Inc.'s Open Data Link Interface for use with devices supporting Novell NetWare 3.11; as well as HP-UX.

All four models support the Simple Network Management Protocol and can be managed via any SNMP-based third-party net management system. Additionally, Crescendo offers the C1802 Crescendo Manager for HP, a net management application running on top of HP's OpenView net management platform that allows the net administrator to manage and control any Crescendo concentrator or adapter installed on the network.

Available now, the C1802 application costs $895.

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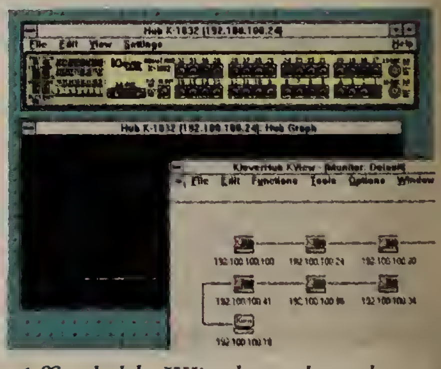

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A net dilemma: how to connect branch offices

BY SCOTT SHULTZ

VENDOR VIEW

As the demand to extend enterprise internetworks out to smaller branch sites increases, users are faced with the challenge of figuring out how best to support those sites.

The greatest computing resources and the bulk of network personnel are usually concentrated at a central office or a few key sites from which the operations of the whole organization are coordinated.

In contrast, the average branch office is simple, has few people and no network specialists. Their local-area networks support a few workstations and perhaps a server, and two or three protocols, such as the Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX) and Network Basic I/O System.

The complexity of the branch office LAN is a fraction of its head office counterpart. And, although branch offices may be the last to install LANs and become part of the enterprise internet, the data they transmit and receive can significantly affect sales and profits.

Traditionally, there have been two solutions for interconnecting branch offices: networks consisting of all bridges and networks consisting of all routers.

BRIDGE VS. ROUTER

Bridges transfer information between LANs according to the Media Access Control (MAC) address of the frame, with no alteration of the original LAN frame. Regardless of the network topology, bridges view a network as a dichotomy, with traffic filtered or forwarded between two segments.

Bridges do not base their operations on network protocols and, therefore, are transparent to them. They are simple to install and maintain, inexpensive to purchase and operate, and give high performance for small networks. However, they are unable to provide best path selection and optimum bandwidth management, and can deliver only limited network security. The performance of a bridged network can become severely impaired by traffic congestion in larger networks.

Routers provide more sophisticated internetworking tools. They direct traffic according to the network address and transfer only those data packets that are addressed to them, thereby improving network efficiency. Routers can determine the best path for delivering data packets, and can ensure lower network congestion, optimum bandwidth utilization, faster network response times and better allocation of network resources.

Since routers use network layer addresses, they need to recognize protocols such as TCP/IP, IPX and DECnet, and support route management protocols such as Routing Information Protocol, Open Shortest Path First and Intermediate System to Intermediate System. Routers supply superior management control and security for even the largest internetworks and are ideally suited to network expansion. On the negative side, routers are usually expensive, and difficult to install, upgrade and maintain.

Clearly, the head office — the heart of the network — needs complex routing technology. Not only does it contain the most computing power, but the head office router also supports the greatest number of local and remote connections.

Regional offices are usually medium to large sites with multiple LAN and wide-area network connections. Moreover, they are frequently linked to the head office and to one another via high-bandwidth links — typically at T-1 data rates — in a loop topology that provides network resiliency and alternate paths. The internetworking requirements of regional offices are also best served by high-end multiprotocol multiport router solutions.

But what about branch offices that are typically supported with 9.6K or 64K bit/sec links? When you are deploying a branch office internet should you install routers out at the periphery or use bridges?

Some vendors recommend distributing limited-capability routers to each remote office. These routers, called remote access routers, typically handle two or three protocols, have one LAN and one WAN connection and contain no flash memory to allow remote upgrading of routing software. The routers build and maintain routing tables for each protocol. The access routers also calculate the best path, even though there is only one possible destination: the central router.

THE MONEY FACTOR

The major disadvantage of this approach becomes apparent when examining the cost of ownership. Installing a router at each site usually requires a visit by one of the central site's trained technicians. And when a new software revision is required, the network manager is faced with two unacceptable solutions: send trained personnel to each site to perform the upgrade — changing erasable programmable read-only memory, for example — or upgrade each access router to a higher capability model containing flash memory. Needless to say, the costs associated with network change add significantly to the initial purchase price.

In general, remote access routers are too complex, compared to the simple branch office LANs they serve, and require a level of support out of proportion to their contribution to network operations.

The complexity of the internetwork grows dramatically and the cost of ownership increases by the number of remote sites using access routers. Additionally, the work load of the network management team increases by every new branch office connection, not to mention travel time to dozens of remote offices and related expenses.

CENTRALIZED COMPLEXITY

The alternative, central access routing, concentrates complex routing functions at central sites — head/regional offices — and puts simple fixed-configuration bridges in branch offices. Routing decisions are made by the central router instead of at each remote site, enabling the remote bridges to be simple devices and answering the need for reduced-complexity, high-performance branch office internetworking.

For example, the use of bridges at branch offices eliminates the need for remote configuration. Only the routers at central sites have to be configured. Since all routing occurs only at the central site, the remote bridges can be connected to the internetwork quickly and easily. Moreover, changes take place on the central routers alone, with no need for remote updating — saving time, manpower and costs.

The two functions of the remote office bridge are to filter and forward packets. The bridge learns only what addresses are on the LAN side. When the address is recognized, the bridge acts as a stop sign, preventing the packet from going over the wide-area link and delivering it to its local address. If the address is unknown, the bridge forwards the packet to the central router, which forwards it to its destination.

The central router also acts as a fire wall, preventing congestion on the other wide-area links in the network. The packets that originated from the remote office can be routed via the central router to its destination anywhere on the enterprisewide network.

Central access routing treats remote LANs as if they are locally attached to the central router. The WAN port on the central router is considered a LAN port, allowing multiprotocol routing between LAN segments. It also takes advantage of the strengths of both bridging and routing without the associated weaknesses of either device. A simple plug-and-play bridge is placed at the branch location, where there is little expertise, and a multiport, multiprotocol router is placed at the central site, where the trained personnel is located. Along with centralized complex routing tasks comes centralized net control, providing security and simplifying net management.

Central access routing is the ideal cost-effective solution for branch office internetworking because it removes complexity at the remote sites, reduces installation and configuration requirements, and eases net expansion, change and maintenance.

➡ Shultz is vice president of sales at RAD Network Devices, Inc.

Information

Continued from page L8

modem server and was still remote control and not remote access: Laptops do not do any of the processing, just exchange screens with the LAN-based device.

Witmer also reported that RLN would have required use of security devices on the remote devices. "Where do you install cards on the laptops?" he asked. "We would have had to buy dedicated Toshiba cards." Furthermore, he found reviews of RLN that revealed Windows performance was degraded when applications were run over the net.

Witmer included an evaluation of asynchronous communications servers such as J&L Information Systems, Inc.'s Chatterbox 4000. This unit — a PC on a card with a modem and LAN connection — is installed in a rack-mountable chassis. Although these devices offer impressive speed, they operate on the principle of dumping screens to the remote PC, a technique that is too slow to effectively run graphical interfaces such as Windows, which Phillips wants to implement in the future.

Witmer discovered prices for some models were more than $10,000 for a six-user unit and rejected asynchronous communications servers as a solution.

FAKING IT OUT

He ultimately recommended Shiva's NetModem/E for NetWare, a stand-alone network server that essentially acts like a self-contained dial-up router. "The software included with NetModem/E for remote users essentially emulates a LAN card in the remote PC, fooling it into thinking that it is physically connected to a network," Witmer said. Its cost of $1,699 per unit made it an attractive option.

Witmer, who has since been hired by Bausch & Lomb to work in Phillips' group, said his decision was based on the company's need to give salesmen access to E-mail, the ability to send and receive Windows files and also the need to access Bausch & Lomb's SQL database.

Access to the SQL database was essential for the salespeople because it contains: promotional analysis data such as shipment information, which tells how much of a certain product was shipped; Nielson data, which tells what was bought; and tactical data, which tells how much it cost.

"We were looking not to take over a PC on the network, but to have the remote laptop do all the processing and just send the data back and forth," Phillips said.

Since NetModem/E provided a transparent link to the remote net, he said it was superior to remote control software solutions and asynchronous communications servers.

Users dialing into the network using NetModem/E see exactly what they are used to seeing when they attach to a network locally, according to Witmer.

His recommendation to purchase NetModem/E was based on several other product features, as well. It can be used with any standard modem to dial in and attach to the network, so there is no need to replace the company's existing modems.

Also, it does not require any communications applications or new user interfaces, runs graphical programs such as Windows without any performance degradation, and offers a wide range of security and administrative functions — such as passwords, dial-back and predefined user lists.

In addition, it is easy to install and configure, and frees existing communications servers for internal staff.

Making any network accessible to users outside the facility creates serious security problems. Phillips ships each laptop separately from its required activation disk, which contains the phone numbers, passwords and software needed to access the LAN. That way, if the laptop is stolen en route to the user, there is no way to access Bausch & Lomb's network without the information on the activation disk.

Furthermore, each person dialing in to the network is limited access to one specific directory: the user's own personal mailbox.

Sales force automation will be a never-ending effort, and the battle isn't over by a longshot. According to Witmer, "Windows is expected to be in place for all field personnel by the end of first quarter of 1994" and the company will look into Lotus Development Corp.'s Notes in the near future.

Witmer also said the company will seriously consider adding Shiva's LanRover/T to the existing NetModem/Es. LanRover/T is a four- or eight-port remote networking server that Witmer said, "would improve network throughput and reduce cost per line."

➡ Thorat is a features department intern at *Network World*.

NET RESULTS

by Mark Gibbs

Network Fascists taking control

Done an inventory of your network lately? You haven't? OK, before you do, list what you think is there. Now, go do your inventory.

What did you find?

Stuff you didn't expect to find. There is always a big difference between the list before the inventory and after.

When hardware and software prices were high, MIS could control what was on the network. But as prices dropped, users started to take things into their own hands. If they wanted services and facilities, they went out and got them. The only exception was where the organization had Draconian policies on who could do what on the network ("Do x, y or z, and we terminate you, with prejudice.").

An extreme strategy to try to achieve total control has been that of the Network Fascists. This movement says, "Let's restrict the scope of the system and then we'll be able to control it." So they give workers configuration A – for example, a 386/33 with an 80M-byte drive – and managers configuration B, a 486/66 with a 120M-byte drive. That's it. No other choices.

Sounds good, but reality is going to come pounding on the door. Users will eventually find that there will be some problem or process that simply can't be done on anything other than, for example, a Macintosh Quadra. So the Fascists let one in. Then Fred in engineering puts up an unassailable argument for a Silicon Graphics Indigo. The floodgates have opened and anarchy takes over.

But, for the moment let's consider a network where the Network Fascists have successfully controlled the hardware. They now have another, less tractable problem to deal with – trying to control the software.

If users are not skilled in computing, the Network Fascists may be able to control software use. But this is becoming less common. In the New Organization – as proposed by Peter Drucker – you are dealing with skilled people. Fewer layers of management and more skilled people producing more, all supported by a structure of Information Technology.

This is definitely the direction we need our organizations to go in if we're to stay competitive in both national and international markets.

Moreover, we're starting to see evidence that this model is really happening.

These knowledge workers are basically users who know what they're doing in their field of work. If they want to use Excel on a Macintosh but your house standard is 1-2-3 on a DOS PC and you, as the MIS management, say, "Forget it, you're getting 1-2-3," you cramp their style.

They're going to be less productive and that effectively reduces the value of the computing services you manage. And the value of your role in the organization.

Not a good idea.

Given the impossibility and undesirability of absolute control, or being able to completely determine what's on the network, the answer is: Give up the idea of total control.

Let users do what they want. If they want to use software that MIS doesn't support, tell them that you don't support it but that you'll help as far as you can. If they want to put virus-loaded software on their PCs, ensure they have antivirus software installed. If they short-circuit the antivirus software for whatever reason, make sure you have some way of knowing that and then warn them of the possible consequences. If they want to leave the antivirus software out, let them do so and isolate the network from them.

It sounds dangerous and drastic to just say "OK guys, go ahead, do what you want," but if you put the right controls in place it is practical. If you make your networks supporting rather than restricting, you may just help your organization survive into the 21st century.

If you don't, if you lean toward the Network Fascist philosophy, the company – and therefore your job – may just not make it.

➡ Gibbs is a consultant and writer based in Ventura, Calif. If you'd like to comment, E-mail him on CompuServe [75600,1002] or on the Internet at "mgibbs@rain.org"

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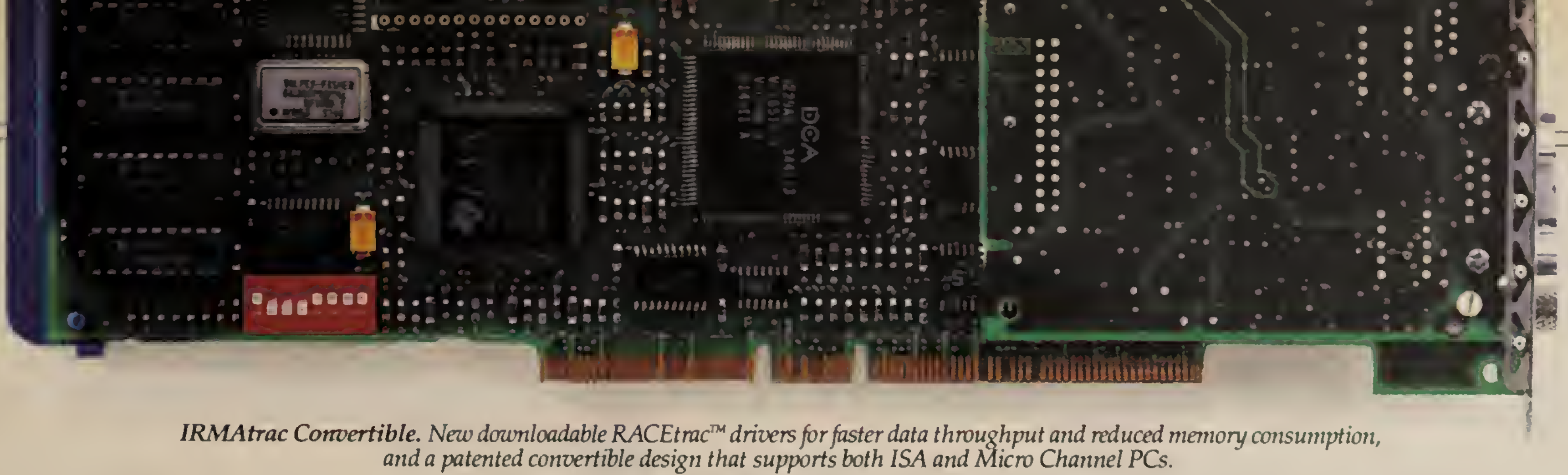

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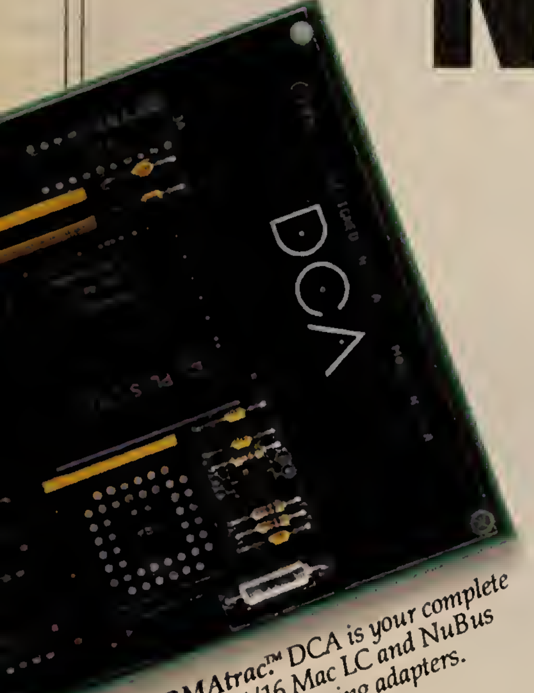

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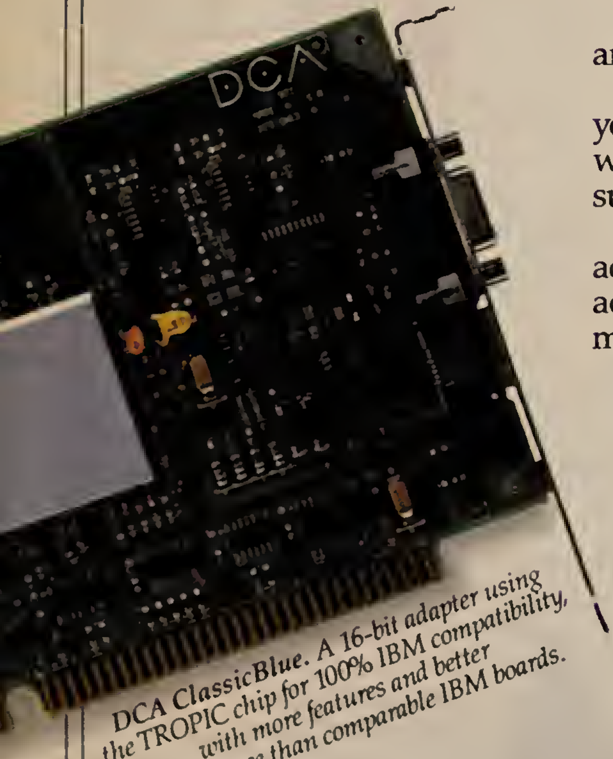

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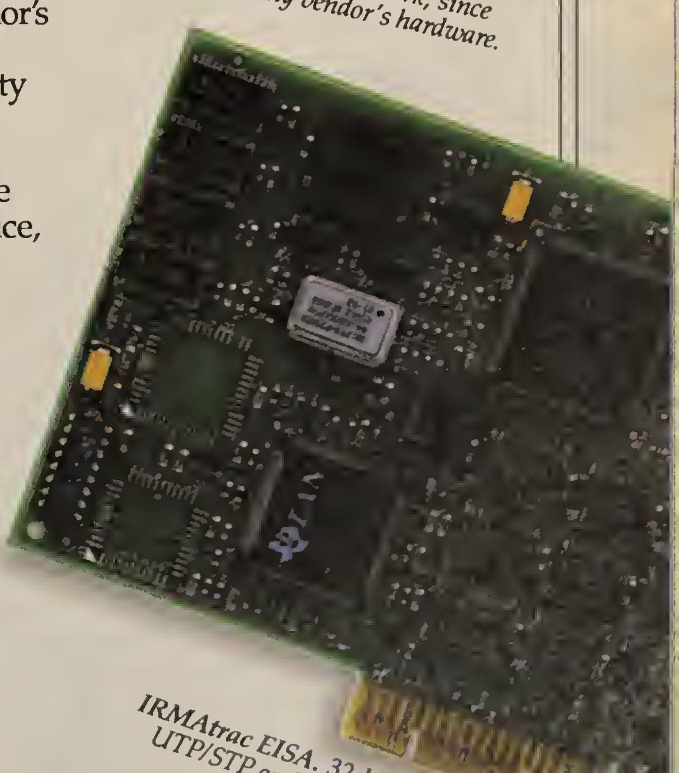

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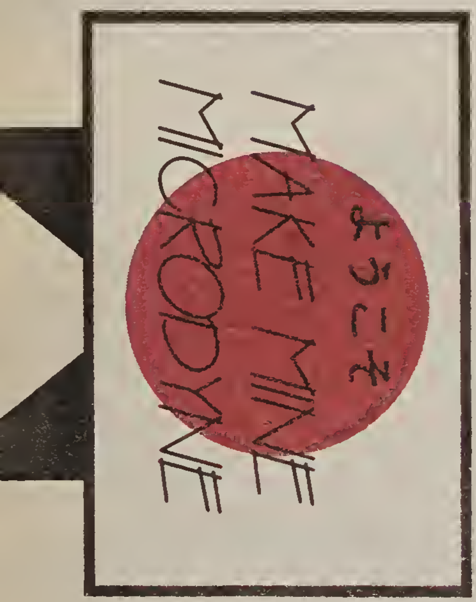

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Circle Reader Service #9

GLOBAL SERVICES

Voice, Data and Wireless Services, Regulatory Issues and Voice CPE

Giving SMDS the exposure that it deserves

First in a two-part series.

BY TOM NOLLE

Voorhees, N.J.

It's a subset of ATM, bit-for-bit compatible with an ATM service. Its technical definition calls for delivery at speeds ranging from 56K to 155M bit/sec. It's been selected for applications ranging from two sites to nearly 100. What is it, some new form of ATM? Transparent carrier LAN service?

No, it's SMDS.

Switched Multimegabit Data Service is a data networking scheme developed by Bell Communications Research in the late 1980s and released as a series of technical requirements (TR), the Bellcore term for standards, in early 1991.

There are a dozen or so TRs on SMDS now, filled with a blizzard of new acronyms such as SIP and ICI. SMDS was the first broadband standard to form the basis of a commercial data switch — Siemens Stromberg-Carlson's EWSM — and the first to be deployed as a tariffed service.

NOLLE

SMDS has not been first in the hearts and minds of users, however. According to many user surveys, firms do not understand SMDS or even know about it. Articles characterize it as a transitional service, something users would not want to bet on in the long term. A year ago, when there was one SMDS customer, it was easy to assume that waiting for Asynchronous Transfer Mode was a better strategy than buying SMDS.

Today, there are at least 100 SMDS customers, all operating at T-1 or above, and SMDS is starting to seem worthy of further consideration. SMDS is certainly alive, and even considered successful by many standards. Why that is so without users realizing it says a lot about SMDS, the marketplace and users.

WHY SMDS?

Data communications relationships may involve terminals and mainframes, clients and servers, or peer systems, but they can all be defined by two characteristics — how long they will last and how much capacity they will consume while they are active.

From a network planning perspective, the easiest kind of relationships to support are those that last a long time and require relatively little network capacity. This is the kind of relationship that terminals have to central computers. Since traffic growing out of this kind of relationship flows along predictable paths and at steady rates, it is easy to design a private network to carry the traffic economically.

This kind of networking begins to break down when data relationships become more casual, require more network bandwidth or both. Casual data partners, such as in a distributed client/server network, may not all be located in the central data center.

As the data relationships among computing devices get more complicated, so does the network.

See SMDS, *page 30*

The Wireless Information Networks (WINForum)

- Advanced Micro Devices, Inc.
- AT&T
- Bell Communications Research
- California Microwave, Inc.
- Diablo Research Corp.
- Digital Equipment Corp.
- Domestic Automation Co.
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- Windata, Inc.
- WiSE Communications, Inc.
- Xircom, Inc.

Apple Computer, Inc., founder of WINForum, last week withdrew its membership.

SOURCE: WINFORUM, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

FCC to issue key PCS ruling with ramifications for microwave users

BY ELLEN MESSMER

Washington, D.C.

The Federal Communications Commission next week is expected to issue a definitive ruling setting aside radio spectrum for licensed and unlicensed personal communications services (PCS), a landmark decision that affects microwave users currently using the spectrum.

With service and equipment providers jostling for a piece of the PCS action and microwave users likely to ask them for millions of dollars as the price for exiting the spectrum, the FCC faces the monumental task of setting up a technical and regulatory regime that will foster much-anticipated growth in the PCS market.

Most of the radio spectrum under review for PCS will go to licensed service providers, which may have to compete for it in spectrum auctions.

But the FCC has indicated that it will set aside 20 MHz between 1910 MHz and 1930 MHz as unlicensed spectrum to give user-owned and -operated equipment free access to new voice and data PCS.

But the industry group Wireless Information Networks Forum (WINForum) is warning that the 20 MHz the FCC has proposed for "User-PCS" is insufficient to meet the bandwidth needs for both voice and data services, and the two should not be intermingled in the same bands.

At least 40 MHz should be allocated to unlicensed PCS, the group said, or interest in developing equipment for this new market is likely to wane.

The FCC could change its course and allocate more than the planned 20 MHz of spectrum for User-PCS, but whichever path it takes, the basic problem of finding a way to compensate the microwave users being displaced by PCS remains.

LAST CHANCE

"This could possibly be the last spectrum allocated to the public for direct personal use," said Bennett Kobb, executive director of WINForum, about the User-PCS bands.

The Clinton adminstration won congressional approval of its spectrum auctioning plan last spring for licensed PCS spectrum. So the FCC decision to move forward with plans made nearly two years ago for unlicensed PCS means the government is willing to hand over radio bands to users, which could probably be sold to would-be equipment or service providers for millions of dollars.

But by establishing User-PCS bands — which will assure customer-owned equipment does not face airtime charges — the FCC will provide an impetus for vendors to compete in building devices such as wireless private branch exchanges, telephones, wireless local-area networks and portable data devices.

Some unlicensed devices would be able to access licensed PCS services.

The members of the WINForum (see graphic, this page) have been debating for more than a year how unlicensed PCS equipment could best coexist in the unlicensed bands that will be made available. The group is not an official standards body, but a working group focused on defining a technical framework that would allow devices based on different standards and technologies to share spectrum.

In June, WINForum issued its Spectrum Etiquette plan, suggesting that half of the unlicensed PCS spectrum should be designated for isochronous, connection-oriented traffic, typically voice services.

See Ruling, *page 30*

BRIEFS

GTE Telephone Operations and **ComputerLand Corp.** last week announced a marketing alliance under which the two firms will offer turnkey data networks to large and midsize businesses.

GTE will provide public net-based data services, including Integrated Services Digital Network and Switched Multimegabit Data Service, while ComputerLand will provide personal computers, networking software, operating systems and support.

GTE Leasing Corp. will provide a variety of financing options.

AT&T Network Systems and **Performance Telecom** have said they will sell a system that will help local and long-distance carriers cut T-1 provisioning time from 25 to 30 days down to one or two days.

The product will free carriers from adding repeaters and line-conditioning equipment to copper-based local-loop facilities.

Beginning in the fourth quarter, AT&T will sell the system under the name T1 Express to the regional Bell holding companies and interexchange carriers. Performance Telecom will market it as CopperAccel to small, independent telephone companies.

AT&T has announced service on a new undersea fiber-optic cable system linking Hong Kong, Japan, Malaysia, Singapore and Taiwan that will give it so-called cable-on-cable restoration capabilities for both switched and dedicated services in the region.

The Asia-Pacific cable spans 4,650 miles and raises the number of undersea fiber-optic systems in the Pacific Rim to six.

AT&T currently offers services that are backed up in some cases by satellite links.

AT&T will also use the cable to provide its Accunet Spectrum of Digital Services at 56K and 64K bit/sec and at 1.544M bit/sec, an AT&T spokesman said.

The **Wall Street Telecommunications Association (WSTA)**, a user group comprising companies based in New York City, will hold a meeting titled Does the Private Network Have a Future, on Tuesday, Sept. 14 from 8 a.m. to 10:30 a.m. at the New York Marriott Financial Center at 85 West St.

WSTA: (201) 425-0900.

The Rutherford, N.J.-based wireless service provider **Nextel Communications, Inc.** — which was formerly named Fleet Call, Inc. — recently activated a combined two-way radio dispatch, mobile telephone and alphanumeric messaging and paging service in Los Angeles.

The service eliminates the need to carry multiple pieces of equipment since all services can be accessed using one unit.

During the test phase, which runs for the next two to four months, the digital service will be limited to 500 customers, but general availability is expected after that period.

OUTSOURCING

Firm hands over reins of expansive net to BT

BY BOB WALLACE

San Jose, Calif.

Dialogue Information Services, Inc. last week signed a five-year, $17.5 million contract with BT under which the carrier will assume control of Dialogue's global data network.

Dialogue currently operates a network comprising 55 old Tymnet packet switches linked via private lines running at speeds from 9.6K to 56K bit/sec.

Some network routes use multiple 56K bit/sec connections.

"Things got to the point where continuing to run our existing network was just too expensive an operation," said Dan Pritchard, director of data communication and systems programming at Dialogue.

The net is used to let more than 155,000 subscribers in 100 countries access business, news and scientific information from 450 databases residing on mainframes at Dialogue's corporate headquarters in Palo Alto, Calif.

Dialogue will migrate its 60,000 Dialnet users to BT and hopes customers that use other public data nets will likewise follow. The Dialnet private network can be accessed locally from 40 cities, while BT's Global Network Service (GNS) can be accessed locally from 520 cities.

"Moving to BT meant that our network could be accessed locally from over 10 times more cities," Pritchard said. "That alone will help us improve the way we do business."

Where Dialnet supports dial-up access at 300, 1,200 or 2,400 bit/sec, BT's net supports dial-up access at 9.6K bit/sec. And BT has detailed plans to support 14.4K and 19.2K bit/sec access, as well.

Additionally, Dialogue's current network supports dedicated access at 56K bit/sec, while BT's supports higher speeds, including T-1.

To ensure a smooth transition from its private network to GNS, Dialogue has added a Dialnet conversion information option on its 800-number menu that allows callers to obtain such information as new access numbers. As an incentive to encourage quick migration to the BT network, Dialogue will offer a 25% discount off current BT connection charges if users switch to BT in October. BT will support Dialnet users during the transition.

Pritchard said the move to BT will enable his company to avoid the high cost of installing faster modems and upgrading existing ones, but he would not say how much Dialogue could save in network costs.

SMDS

Continued from page 29

There are fewer predictable information routes and less traffic on each. As data bandwidth requirements become more varied, the cost of supporting the peak levels that any conversation might demand on any route such a conversation might take becomes excessive.

Local-area networks support casual relationships today, and one reason they can do that efficiently is that they are based on a connectionless architecture. No specific set of network resources must be allocated to any user conversation, so it is not necessary to forecast the exact nature of the demands that such a conversation would generate.

But when LANs are interconnected over carrier services, the services rely on connections. Even frame relay has permanent virtual circuits. Users must assign routes and capacity to each connection to order the service from a carrier. Once they do that, the characteristics of those connections may limit the flexibility of the user-to-resource relationships that users are trying to support.

SMDS was developed to provide the LAN user with the same kind of service in the wide area that they were consuming at the local level. SMDS is just as connectionless as LANs and supports the same kind of multicasting and datagram services that LANs do. In fact, SMDS appears to a given networking or internetworking application as a kin of big backbone LAN.

You can link work group LANs to a backbone LAN via a bridge or router, and you can do the same with SMDS. You can give users access to high-performance computers or file servers via a backbone LAN, and you can do that with SMDS, as well.

Frame relay or even leased lines can be used to build these same types of networks, but SMDS has a unique value because of its connectionless nature.

Suppose a major outlet chain has a dozen stores in a metropolitan area. It wants to provide customer service personnel in each store with access to the inventory files of all locations, plus that of a central warehouse, to help customers find items that are out of stock in their local store.

How much network capacity should be allocated to each store? That depends on how often each store might need to access any other. In other words, there is no easy way of knowing.

With any connection-oriented service, the user would have to guess about relationships and volumes of data exchanged just to build the network. With SMDS, the user simply links each store to the network, and everyone can communicate as needed. It's just like a big LAN.

One limitation imposed by SMDS, and LANs, is total information rate. The pipeline that links a user to the SMDS network determines how much information, in total, a user can send and receive, just as a user's LAN adapter rate does for local networks. But SMDS can call on a variety of data rates — faster than any of today's LANs or slow enough to be inexpensive for carriers to deliver over existing digital circuits.

Originally, SMDS was designed to operate at either T-1 or T-3 rates, and most of today's SMDS activity is at the T-1 rate. SMDS specifications at the Synchronous Optical Network Optical Carrier-3 rate (155M bit/sec) and at 56K bit/sec have also been developed.

Another limitation of SMDS is its data-only orientation. The end-to-end network delay imposed by SMDS can be as high as 140 msec, and delay variability due to different traffic patterns can be large enough to make transport of constant bit rate traffic, such as voice or video, impossible. This is why some users believe that SMDS just does not go far enough and that ATM is the real answer.

Interestingly enough, in many respects, SMDS *is* ATM. ATM Class D connectionless services, delivered in accordance with the ATM Adaptation Layer 3/4 standards for a T-1 or T-3 physical interface, would appear, bit for bit, identical to SMDS services.

While this is no assurance that current SMDS services could be upgraded in the future to support some of the other classes of service that ATM offers, such as constant bit rate voice and video, it is a technical goal of most ATM switch vendors. Those that endorse ATM and view SMDS as a kind of strategic dead end should reexamine their protocol charts.

➡ Nolle is president of CIMI Corp, a Voorhees, N.J., consulting, research and education firm.

Ruling

Continued from page 29

The other half of the allocated spectrum would support asynchronous data services.

WINForum said that it has not yet come up with a way to mix them that would promote fair access to the spectrum.

The FCC next week is expected to decide whether the WINForum suggestions may form the basis for new PCS equipment rules.

COULD I ASK YOU TO MOVE?

The FCC selected the spectrum between 1910 MHz and 1930 MHz for "User-PCS" because these bands were determined to have the least number of microwave links in the 2-GHz range under review.

The FCC has already determined that microwave and PCS cause interference with each other, and that microwave users, except for public-safety users, have to move to make way for PCS. But the FCC also decided that those displaced by PCS should be compensated for their expenses (see "Problem of paying microwave users looms," this page). It's uncertain how makers of unlicensed-PCS equipment will compensate microwave users.

WINForum estimates there are about 400 point-to-point microwave links in the 1910 MHz to 1930 MHz bands and that it will cost about $250,000 per link to move these users to new bands designated by the FCC.

Some in the industry have argued that a more satisfactory answer to booting out the microwave users is to initiate a retuning of microwave stations to make more efficient use of the available spectrum, but the FCC does not appear willing to pursue this as an option.

Problem of paying microwave users looms

In its decision released in August, the Federal Communications Commission set up different rules for licensed personal communications services (PCS) and unlicensed PCS when it comes to negotiating fair compensation for displaced microwave users.

For licensed PCS, the would-be PCS provider would have two years after filing a license application to voluntarily reach a settlement with the incumbent microwave user.

If the two sides do not reach an agreement in that time, a mandatory one-year negotation period would follow.

The would-be PCS provider would have two years after filing a license application to reach a settlement with the microwave user.

But the manufacturers of unlicensed devices will have a mandatory one-year negotation period with microwave users once the "User-PCS" spectrum is allocated and an equipment maker wants to sell in an area where microwave could cause interference.

Bennett Kobb, executive director of the industry group the Wireless Information Networks Forum (WINForum), said this requirement is creating tension between manufacturers of voice equipment, which want early deployment of PCS, and makers of data-PCS equipment, which are opposed to early deployment.

Early deployment would let User-PCS vendors of both stripes sell into a market before the microwave incumbent is bought out. Full-clearing deployment would require the bands to be cleared before products are sold.

The makers of voice equipment, such as wireless PBXs, tend to favor early deployment because their equipment is unlikely to cause interference with nearby microwave users.

That is because such voice equipment is not constantly moved from place to place.

But data-PCS equipment vendors, concerned that portable equipment could cause interference if moved into the range of microwave stations, want full mobility assured.

Early deployment would require data-PCS vendors to market their equipment as fixed-site equipment, and such a restriction could chill user interest.

Apple Computer, Inc., whose principal scientist for wireless communications, Jim Lovett, founded WINForum, abruptly withdrew the company's membership in the group last week due to the increasing strain between the voice and data sides of the emerging PCS industry.

Whatever the FCC's decision next week, unlicensed PCS equipment vendors that want to be first to market will be the first to confront the problem of paying out the local microwave user.

Having to shoulder this burden could raise the cost of PCS equipment prohibitively.

"This alone is a treacherous area," Kobb emphasized.

BY ELLEN MESSMER

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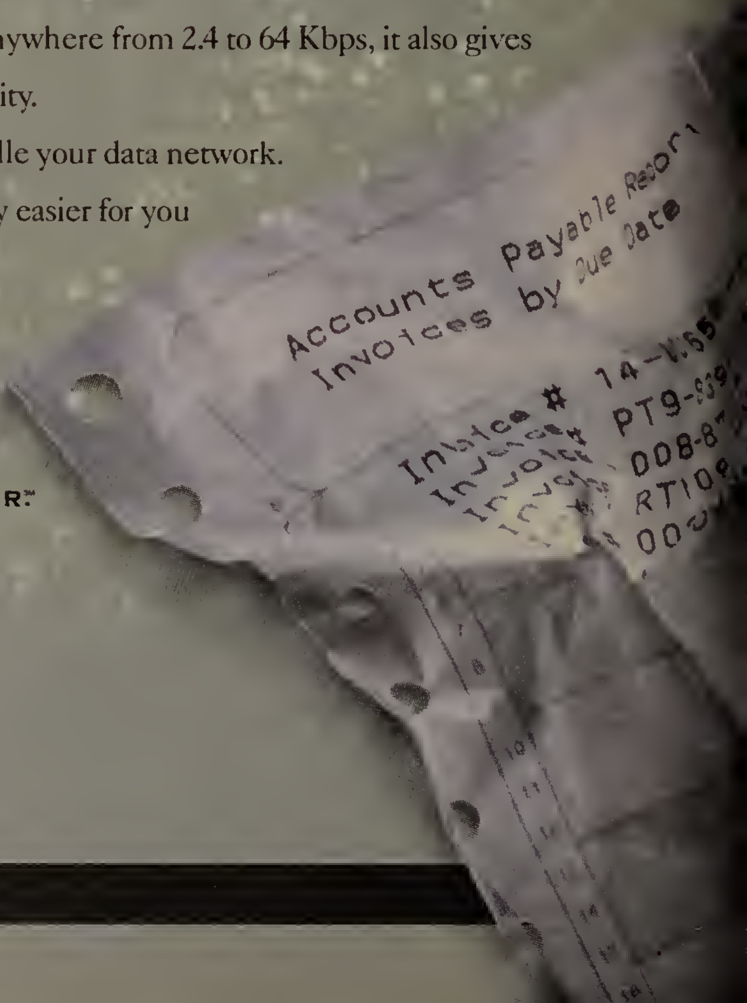

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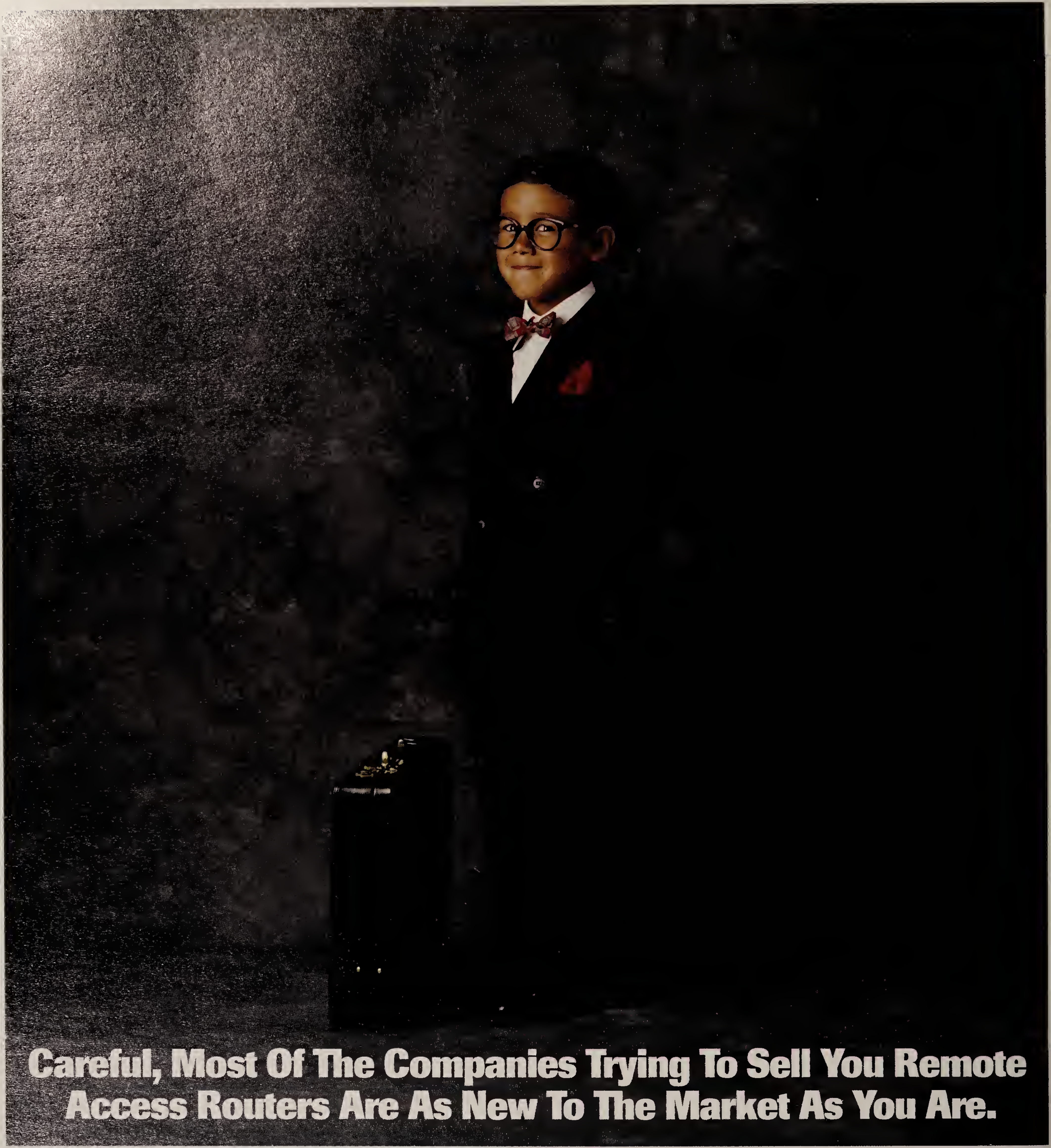
LAN LEADERS

Client/server pioneers debate the ins and outs of developing a successful LAN strategy. Page S2.

Sara Lee's Paul Bandrowski talks about the need to marry mainframe concepts to enterprise LANs. Page S9.

Boston-area hospital finds downsizing cures those host pains. Page S19.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The future comes soon enough

German-born physicist Albert Einstein is credited with quantum leaps in scientific thinking, yet he never was much for looking ahead in time.

"I never think of the future," Einstein was fond of saying. "It comes soon enough."

Einstein's theory is relative to net managers, some of whom share the same ideology and have dived headfirst into a wave of emerging technologies.

These are users that have embraced client/server computing, multimedia, imaging and groupware to give their organizations a competitive edge.

"One little bit of information can be the difference between getting an account and not getting an account. It can be worth millions of dollars," says Bill Wilson, MIS director for Johnson & Higgins, a 150-year-old New York insurance brokerage. "Our business revolves around information. We really don't have any products except for information."

Net managers like Wilson are leading their companies into the unchartered domain of client/server computing, blazing new routes that allow corporations to manipulate data faster and respond to changing market needs quicker than mainframe shops.

These users are not giving up entirely on host computing; many are taking lessons learned there and applying them to distributed LANs.

One mainframe concept applied to the client/server architectures is the notion of the secured glasshouse. In this approach, an organization such as Sara Lee Corp. centralizes such resources as servers and shared-disk storage devices.

"Distributed computing doesn't have to mean distributed computers," says Paul Bandrowski, advanced technical manager at Sara Lee's corporate headquarters. "Most companies need centralization of network resources."

Such a firm organizational grasp of core net services lets these companies deploy leading-edge technologies like multimedia and imaging to improve existing business applications.

"This is not rocket science," says John Winterhalter, manager of IS at 3M Co.'s Commercial Office Supply Division. "What we're doing here is simple. As soon as people realize that, there's going to be a multimedia explosion."

But time is not an element these users heed. The innovative network users are the ones that grasp new technologies and learn how to apply them to their core business applications before they're proven. Some folks call these companies bleeding-edge users, but, in reality, they are true LAN leaders.

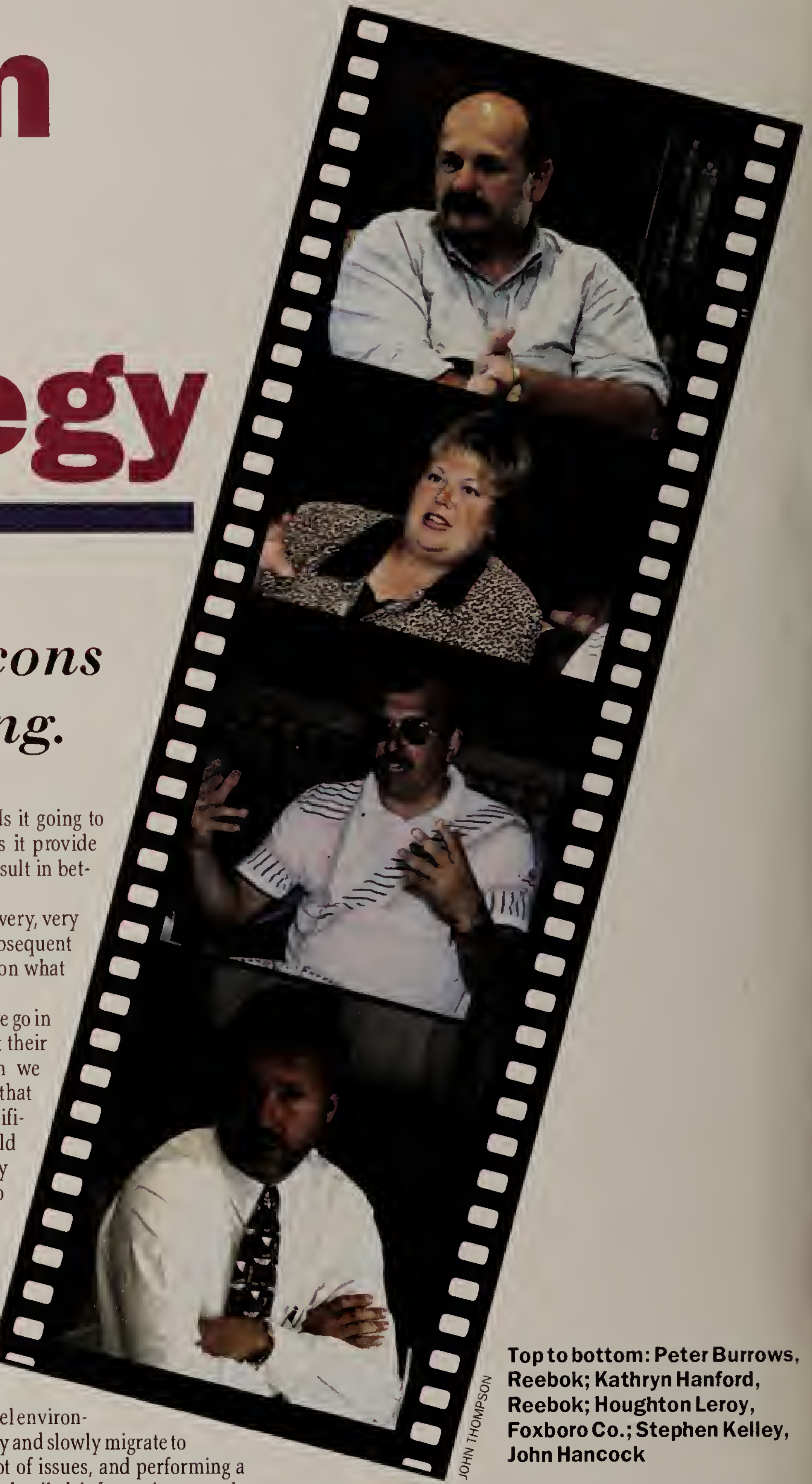
"It takes time for people to absorb new ways of doing things," Sara Lee's Bandrowski says. "You have to be more intelligent; you have to be more educated. With client/sever, it's more difficult, but it's more flexible, and it's worth it."

Charles Bruno
Features Editor

Building an enterprise LAN strategy

BY JOANNE CUMMINGS

Representatives from 3 user companies discuss the pros, cons of distributed LAN networking.



JOHN THOMPSON

Top to bottom: Peter Burrows, Reebok; Kathryn Hanford, Reebok; Houghton Leroy, Foxboro Co.; Stephen Kelley, John Hancock

Creating a strategic plan that builds on advances in client/server technology while preserving investments in older mainframe-based computing systems is a tall order in any business. In hopes of gaining insight into the strategies, cost justifications and methodologies of such a paradigm shift, *Network World* invited representatives from three large companies in varying stages of implementing such a plan to discuss their experiences.

Those who gathered at the Boston Harbor Hotel were Peter Burrows, director of corporate engineering at Reebok International, Ltd. in Stoughton, Mass.; Kathryn Hanford, director of global voice and data communications at Reebok; Houghton LeRoy, principal network engineer at The Foxboro Co. in Foxboro, Mass.; and Steve Kelley, general director of distributed technology services at John Hancock Mutual Life Insurance Co. in Boston.

LeRoy's firm, Foxboro, recently completed a successful move to a distributed local-area network architecture that has resulted in significant cost savings and efficiencies (see story about Foxboro's honorable mention in *NW*'s User Excellence Awards, Nov. 23, 1992, page 41). In fact, Foxboro is now beginning to offer advice and consulting services to other users interested in making similar changes to their network infrastructures.

John Hancock is in the midst of the transition to distributed computing. The company still has critical mainframe applications running alongside myriad departmental LAN applications. Kelley heads up the committee at John Hancock charged with formulating the firm's client/server strategy.

Burrows and Hanford have just finished pulling together a strategic plan designed to streamline Reebok's production processes while eliminating its several islands of automation, with the linchpin of the plan being a strong move toward distributed LANs and client/server applications. Interestingly enough, Burrows piloted Foxboro through its massive downsizing effort before joining Reebok this past year. Each of the participants offered their caveats and advice to users facing similar treks.

How do you go about formulating a strategic network plan based on distributed computing?

Kelley: The first thing we need to do is sit down and try to get a clear picture of the objective. Why is somebody interested in moving to a distributed LAN setup? What are the intended business objectives? Is it going to result in cost reductions? Does it provide improved flexibility? Does it result in better response times?

I want to see that articulated very, very clearly because the whole subsequent design would have to be based on what those objectives are.

LeRoy: For our customers, we go in and do a site survey and look at their business objectives first. Then we interview each department that would be required to do the modifications and see how they could best benefit from a new strategy and how difficult it would be to move their critical applications to the new platform. That determines how much impact you're going to have on the organization. What you don't want to do is create turmoil so they can't do their jobs.

Sometimes you need a parallel environment so they can do it the old way and slowly migrate to the new method. There are a lot of issues, and performing a site survey first helps you get detailed information on what those issues are.

How do you go about partnering with your users in formulating a strategic plan?

Kelley: At John Hancock, the process is managed by a committee comprised of [information systems] people and folks from all of the business sectors. So there is never an instance in which the corporate IS unit decrees a particular direction.

All business people are involved in determining what makes sense. Fairly high-level people from the business sector come together to determine what the framework should be and how best to move to client/server.

I think that's very important. Business people have to drive it. And you need to get people to focus on linking the technology and the business.

What type of business objective would push you to move to a distributed LAN setup?

LeRoy: Cost savings, quality improvements, cost containment. If you're going to reduce the costs by half over the next five years, go for it.

Burrows: The application portfolio should be your prime network decision factor, and that should never be driven by the technology decision. The application portfolio should be driven by the processes of the company. You have to link the direction of the company and the processes it's trying to support with the application portfolio. Once you make that clear, then you can determine the best kind of network.

Frankly, there is nothing wrong with mainframes for certain applications. I would be a little wary of somebody concluding that the answer is to get rid of the mainframe and move right to client/server.

Kelley: One strong objective that calls for a distributed LAN setup is rapid turnaround of applications. If you're in an environment where your products are turned regularly, like our financial services products, you have to be able to get those to market quickly, and you can't afford to have a one- or two-year

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Continued from page S2

development process. The change should stem from a business requirement.

Burrows: When I started with Reebok, many of the problems stemmed from the fact that it had a lot of mainframe CICS-type programmers who had no real experience with client/server.

We told them, like it or not, there are standards for ease of use being set at the desktop by $99 and $200 software packages. And when users go out and buy those packages, whether it's for home or work, that's setting the standards for the software we develop, and we have to meet that same ease-of-use requirement.

What is the downside to moving to a distributed computing environment?

Burrows: One thing people talk about when they consider client/server computing is being able to move away from the cost of mainframes. And I think the school is still out on whether client/server is cheaper.

Kelley: Sometimes it isn't.

Hanford: Maintenance becomes a costly critical factor.

Burrows: The companies that are successful in getting cost reductions are the ones that are doing reengineering along with the migration to next-generation technology. Where is the benefit of recompiling a mainframe application to run on a different machine? I don't think that will result in the kind of longer term cost savings you would have gotten if you rethought the process in the first place.

How am I doing order entry? Where should I capture the information? Is it a lot sooner in the process? You can't just move to a different platform — you also have to rethink the way you do things.

Hanford: That is one area where people will definitely fall down if they don't take the time to look at the way their processes work today.

One of our first steps in formulating the strategic plan was to look at the process and find out where we didn't even have any automation, and figure out if the process even makes sense. That's a crucial point that I think sometimes gets overlooked.

What role can the mainframe play, if any, in a distributed computing environment?

LeRoy: I think it's important that we redefine what the mainframe really is. The concept of a mainframe is still useful.

You have to think of it more as a central repository for a large amount of information. There's always going to be a place for it in the large corporation because of the amount of capacity it has. And the more you distribute that capacity around the company, the more difficult it is to manage it. I think you'll always have room for the mainframe in a corporation.

Hanford: I agree. But I also think that once it becomes that central repository, you need to decide whether it's the smartest thing to maintain it in-house or outsource it. And that is the issue people have to look at.

But would you trust your critical business data to somebody else?

Hanford: Most of our critical data applications are going to be residing on LAN servers. We've taken the majority of them and ported them down to LANs. I don't foresee any new application development on the mainframe.

Burrows: Once you've defined your strategy, and you conclude that you want to move to a next-generation application portfolio, you have to decide whether you want to hang onto this old mainframe-based stuff forever or turn it over.

You may decide you don't want to maintain that platform anymore. And if you're looking at replacing the mainframe, will you ever develop another application for it?

Hanford: Mainframe application development costs so much more and takes so much more time. Why would we want to continue to do that? When you start to move your largest and most critical applications off the mainframe, all of a sudden you're down to having a big empty box, and it starts to make sense to outsource that.

Where do you look for your applications when considering a move to distributed LANs? Do you concentrate on building everything in-house?

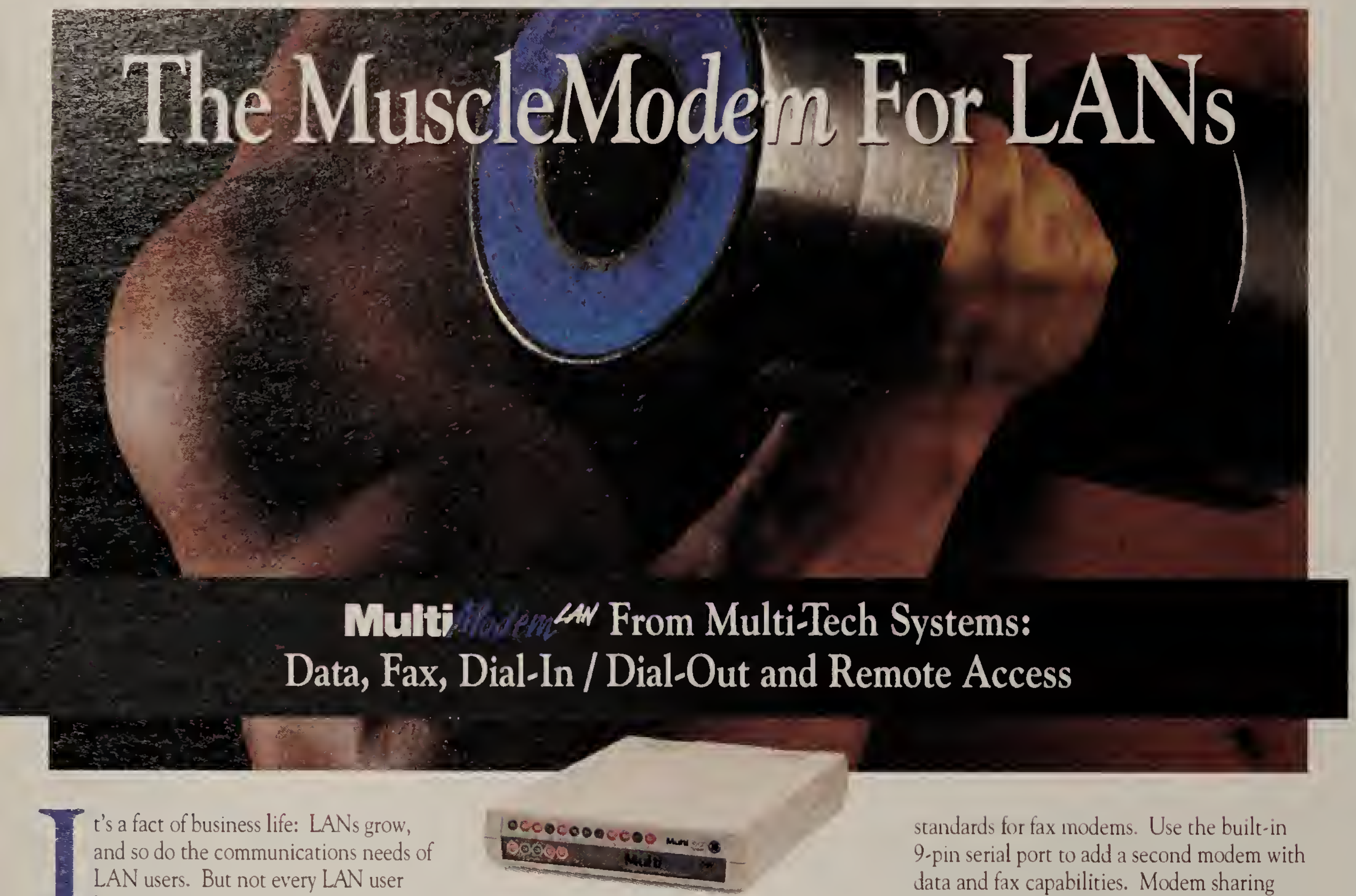
LeRoy: People need to realize that a lot of these applications have been done before. Don't go out and try to recreate the wheel because you may find out that somebody else has developed a package that fits your environment perfectly. People need to take advantage of those [applications] when they're available.

How do you find out about them?

LeRoy: Most manufacturers have third-party catalogs that give you a description of all their third-party applications, even those developed by other end users. They're a great resource.

Burrows: One of the issues when you pick things up off the shelf, though, is that you are practically guaranteed to end up with more than one type of database.

If you're taking a manufacturing system from one person and a warehouse system from another, they will all prefer a certain relational database. You have to realize you need some kind of data mapping tool, as well. You need some way to map the various third-party packages, as well as other technology, to your own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environment.

Kelley: That is why we recommend a strong standards approach. And we don't just mean standards coming from corporate IS, but also standards that the entire business group determines makes sense. If you go in that direction, with four or five or more databases and a lot of different products, eventually they're not going to interconnect well.

So is that one of those hidden costs, when a renegade goes out and buys something not supported by central IS?

LeRoy: Usually if that's happening, there is something wrong with the organization. They don't have control over their organization.

Hanford: That is a management problem. We still have that problem. People are still going out, doing their own thing. They're spending a lot of money and wasting a lot of money. The wrong people are making the wrong kinds of [buying] decisions. Then we're expected to come in after the fact, pick up the pieces, and try to do something with it.

It's getting better, though, because we've built a kind of little family, not just with the business users in our headquarters, but we're also reaching out to our regional offices and subsidiaries in Europe. We try to sit down and have conversations with them to say, let's face it, we can't do it this way. Let's figure out together how we can do it.

Burrows: We use the analogy of a traffic light. Somebody wants to buy something and it's a spreadsheet, and it's on the preferred standards list, so it's a green light — go ahead.

If somebody says they need to buy a package that runs on a different database in order to develop a certain application, that's a yellow light. We take a look at that, and sometimes we say they could have bought the application or we have another department that is doing the same thing.

But, then again, we might agree that it is an appropriate use of that technology, as long as they're prepared to support it.

Some things are red lights. For example, if you wanted to bring in another mail system — no way.

Hanford: I think the problem gets worse once you get outside the physical building or area that you're in. We seem to have more of a problem because we're a global organization. We have 13 subsidiaries internationally and 43 distributors, and they all have different stuff.

Now, all of a sudden, we're trying to create a global network infrastructure that is going to link everybody so they can share data. Eventually, we're going to find out that what we're doing may not be compatible with what we have everywhere because the arena is just too big.

Kelley: There's a balancing point. As technology people, we can't be the sole dictators of that mandate to connect everything. The business people need to play a part, as well.

So once you've decided to move to a distributed LAN architecture and have been assured that it fits in with the corporation's business goals, how do you go about doing it? Do you start from scratch? Do you try to retrofit what you have in place? What's the next step?

Burrows: It depends on your sense of urgency, how quickly you need to move. You have to look at the number of transactions you process.

If you're a large company processing a lot of transactions, you should not move totally to client/server right now. If you look for companies doing it, you won't find many. Most of them are starting by doing decision support or off-loading reporting functions, maybe changing over dedicated departmental applications.

If you have some time, you can decide on the surrounding strategy. For instance, you could keep the mainframe in the middle and start putting in the LAN infrastructure. Then you can slowly migrate users to PCs — maybe do that on a department-by-department basis.

Yet you are still having them tied to the mainframe. You could simply reformat the screens to run under a Windows format, for example. That is a temporary fix, but end users don't know they're still on the mainframe. They get an easier user interface, while you have time to put the proper infrastructure in place.

We're migrating the entire customer service group to 486 workstations with 15- and 17-in. color monitors, and one of the applications they have is a window back to the mainframe. We're building entirely new applications for client/server, so for now, they're working in both environments.

Hanford: You need to take things one step at a time. These people just came off of 3270 terminals, so we're giving them a piece of the new environment, letting them get their feet wet and get used to it.

Burrows: You have to start with the infrastructure — that needs to be put in place first. The other thing you want to do is to size the workstation and the LAN to support your applications long-term. The technology should be driven by the application you're trying to build.

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Continued on page S6

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Continued from page S5

They have five or six windows open and are accessing multiple databases. The network is configured to support that.

Kelley: Unfortunately, it's almost impossible to keep up with bandwidth demands, no matter how well you plan. If you try to size it for a substantial amount of growth — doubling or tripling whatever you think the application will need — in a very, very short period of time, you've used up all the bandwidth and need more.

LeRoy: You need to be able to control your network so that garbage doesn't accumulate. I know people that have games and their E-mail files stored on the server. All of the utilities they gathered from their friends go up there. Sometimes they do backups of their whole drive to the network. You have to manage that.

Kelley: That is a really important point. A lot of the management tools you had in the mainframe environment for taking care of that kind of thing do not exist in the LAN environment. When all of these individuals are left to determine what they want to put on their machines, it can quickly get out of control.

Hanford: One of the first things we did was to figure out how to consolidate everything and get down to one type of LAN operating system. First, we set our standards.

We are going to do Ethernet everywhere we can. We have some token rings in place but decided to leave them because they're not causing any problems right now. We had some Arcnet that we yanked out and converted to Ethernet.

You cannot look at it as a departmental thing. You have to look at the entire picture, decide how you are going to make it work and put enough bandwidth in there so that a year from now, you're not looking at trying to expand things because you didn't do it right the first time.

The real key is understanding what your company's long-term plans are.

How do you do that?

Hanford: Spend a lot of time with your users and with high-level executives in your organization to find out what is going on, why the business needs are changing. You cannot do it in a vacuum, and that is one thing IS organizations have done in the past.

They think they know what is best for the organization when in reality, most IS people don't understand the basic business. You have got to know the business before you can do anything to solve the business problem.

> ***A lot of vendors come to the table with those boilerplate-type solutions, and we get totally offended. We're not boilerplate.***

Is communicating with companies outside your own organization more difficult in a distributed environment?

Kelley: No. You have a lot more points of entry, and that gives you a little bit more flexibility. For example, if you're running a mainframe-based mail system, it can be a little bit more difficult to link to a variety of other mail systems.

Hanford: We lived in a vacuum for five years on an E-mail system that was homegrown residing on the mainframe. We couldn't talk to anybody else. But then we realized we didn't just want to talk to Reebok people, we also wanted to go outside of the company and talk with vendors and suppliers. Moving to a more standard mail system was the only way to make it happen.

LeRoy: Standards are the most important thing because if you stick to a well-accepted standard, there is a good chance that you will be able to talk to other vendors and customers.

Kelley: Those standards don't need to be specific product standards. They can be [application program interfaces] or protocol standards — anything that offers more of an opportunity to interface with others.

How does user buying power stack up in a distributed LAN environment vs. a mainframe shop?

Burrows: It's about the same. In a distributed environment, you need to get the number of vendors down to a manageable number. If you are buying from 20 different hardware suppliers, chances are you won't be able to stay on top of what the next releases are.

There is a tendency, I think, for big companies to keep the number to a handful. That gives you better buying power.

Kelley: In addition, a smaller number of vendors gets to know you a lot better and know your business, so it can become more of a partnership.

Hanford: We want our vendors to come in and know our business inside and out. A lot of vendors come to the table with those boilerplate-type solutions, and we get totally offended. We're not boilerplate. We're Reebok.

We want them to pay close attention to the details that make us different, and the only way you do that is to spend time with us.

Burrows: The problems in a distributed environment are clear when you look at what the [Open Software Foundation, Inc.] is trying to solve with the [Distributed Management Environment] or the [Distributed Computing Environment]. They're trying to put in a tool set to manage the distributed environment. Whether that is the right answer or not, I don't know.

But you need to examine things like license brokering, controlling licenses in a distributed environment. Another thing is software distribution, or distributing software from one place and maintaining it across the network.

Task brokering is another issue. I have all this processing power on the desktop and everybody went home at five o'clock. Can I go tap that? There are a lot of issues that still need to be addressed in a distributed environment.

Take distributed database management. A lot of the distributed hardware platforms tap out when they reach a certain database size and cannot physically handle some of the sizes that you need. There are still a lot of those kind of issues.

Is staffing more of a problem in a distributed LAN setup?

Kelley: It's very different. Previously, you

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had people who specialized in supporting a particular product. They knew it in-depth and could support it quite well.

But now you have to develop a whole new group of people that are more like systems integrators. They need to know different products and how to tie them together.

When you have a problem, it may involve four or five different products across multiple platforms. It requires a much more sophisticated person.

Burrows: Another problem is network management. It's difficult when you don't know where the data is anymore and you don't know who is causing some of the storms in your network. You need to manage that closely because people could be going anywhere in the company and moving files of any size, and if you haven't built the right kind of controls and monitoring, you're in trouble.

Hanford: Managing a distributed network is much more complicated. When the user calls with a problem, it could be any number of things. It's a very complex environment.

Kelley: The people responsible for correcting that problem could be in any of a number of different areas. Before it was a network problem or a hardware problem. Now we have people call up and say the PC isn't working or the application isn't working. What do you do? Where do you begin to look? Is it a line problem, an application problem, a server problem?

Hanford: The real issue that we're going to face as we take on client/server computing at Reebok is just how much administration and support we'll need around the world to make this happen. The verdict is still out on that. We can speculate, but we can't know for sure.

Kelley: We provide a centralized area that people can call for assistance. But what we're finding is that so many people are getting so sophisticated out there that it's difficult to maintain a high level of support.

When you talk about people developing things on their own, they're not all doing it the same way. You run a great risk of people doing some mission-critical types of applications in ways that may be different from everyone else or may be difficult to support. And some people are not concerned with security.

But then security is a problem. Mainframe security was great, but security issues haven't really been resolved for distributed networks.

How do you handle that? Do you try to bring the mainframe security down to a LAN environment, or do you try to do something totally different?

LeRoy: Totally different. On a distributed network, someone with an analyzer can look at all the traffic and information going across the network. And, so far, there aren't too many encryption techniques, so you have a lot of potential for breach of security that didn't exist in the mainframe world.

From a financial point of view, that is serious because we don't want people picking up financial information from our environment. But for us, we really don't have that kind of critical data, so we settle for an environment with a little less security.

Kelley: That is one of the reasons we keep the data servers consolidated in a single place.

Burrows: A lot of the mainframe tools are now being ported to the downsized environment, though. Security's coming.

Kelley: But it's not here.

Is that enough of an argument to hold off on moving to a distributed environment until all the tools are available?

Hanford: No. You have to identify what the risks are. It depends on the industry and how critical your information is.

How do you manage your bandwidth in such an environment?

Burrows: You always want to stay ahead of the user, and you have to set priorities. If I have too much on the network, am I going to stop doing E-mail?

Kelley: Another important point is that bandwidth is cheap. You can get a T-1 line for a fifth of what the cost used to be. So you don't have to focus on it as a cost element quite as much.

LeRoy: Also, you need to look at new technologies. There are multiplexers now where you can do 56K bit/sec between a remote site and headquarters, and you can do your fax, your data and your phone all on one line. There are all sorts of options today, and you can save a lot of money by checking them out.

What is the upside to a client/server move then? Is it worth it?

Burrows: Client/server makes you rethink the traditional way of developing a system, and one of the things is rapid application development.

Right now, we're going through a 13-week, three-phase development effort on a very major application, and we're doing it sitting in the user department.

We ask them whether they like the screen, and if they don't like it, we change it right there. We're talking about soup to nuts, from idea to delivered system on the right infrastructure in 13 weeks, as opposed to six months or a year in the mainframe world.

Kelley: It allows for much more rapid prototyping, and it allows the customers to pretty much define right up front what it is going to look like because they're comfortable with the technology. Then you just write the code behind it, and that makes it a lot easier.

LeRoy: We had a very good experience at Foxboro. We migrated to the LAN environment. We noticed that as the end users had more of the computing power, many of them were very innovative. They came up with ideas and concepts that make the job easier because it's in their interest to make their job easier.

Hanford: And they know their job better than anybody else.

LeRoy: So these people are actually developing applications at a local work group level that are much more efficient than the mainframe applications.

Hanford: There are pluses and minuses. If it's more complex, why do it?

LeRoy: There is an advantage.

Hanford: You have to be able to look at what the advantage is. You have to be able to show that we're still ahead of the game.

LeRoy: We went from a $30 million to a $15 million operating budget. That's pretty damn significant. That's cost justification right there. How can you ignore that?

⊸ Cummings is a free-lance writer in Marlborough, Mass.

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Circle Reader Service #19

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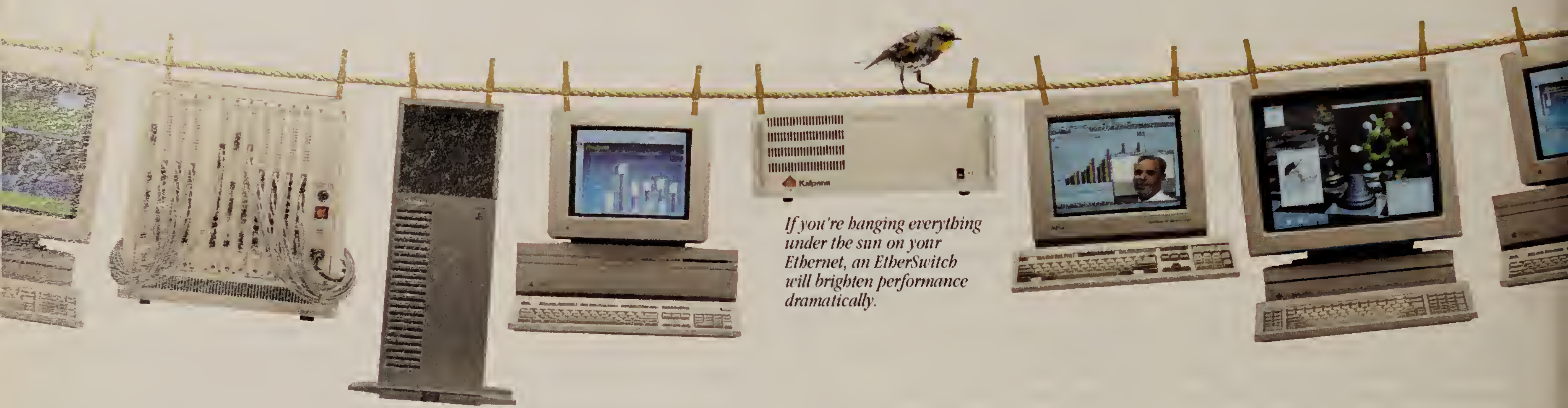

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Circle Reader Service #20

Nobody does nets like Sara Lee

NEIL MACDONALD

BY PAULINA BORSOOK

If things had been handled differently, Sara Lee Corp.'s decision to downsize applications at each of its independent operating units from mainframes and minicomputers to client/server technology could have turned out to be a network manager's ultimate nightmare.

But a conscious decision to set up an internal corporate consulting group to aid the operating units is smoothing the move.

In keeping with the corporate culture of decentralization, each of Sara Lee's operating companies are fully autonomous, each with its own chief information officer (CIO) and local-area network analysts.

All told, Sara Lee's operating units have hundreds of individual networks supporting a total of about 300 servers as well as 15,000 terminals and microcomputers. Indeed, the firm has thrived on networks, which have "every technology and every solution," says Paul Bandrowski, advanced technical manager at Sara Lee's corporate headquarters. Bandrowski heads the team of corporate-level consultants that help individual CIOs develop client/server strategies.

This is part of Sara Lee's overarching commitment to client/server technology, which it bets will provide each operating unit with the competitive advantage needed to fulfill the corporate mission of being first or second in every one of its consumer retail market categories.

While each operating unit is free to select any type of server and networking equipment from any vendor, the corporate team has settled on Unix-based systems as the preferred server platform for applications that demand high performance. The team also suggests that each company buy networking products and software from a list of favored vendors.

For instance, the corporate team suggests that individual operating units buy hubs from Cabletron Systems, Inc. and SynOptics Communications, Inc., routers and bridges from Cisco Systems, Inc., Proteon, Inc., Wellfleet Communications, Inc. and 3Com Corp., application development software from Gupta Corp. and Powersoft Corp., and decision support software from Red Brick Systems. The group also has a national account with Novell, Inc.

Buying from the favored vendor list ensures that individual operating units will get discounts from the vendors and that they can tap corporate staff for installation and expert support services. The corporate staff will support other vendors' products but may not be as familiar with them.

CLIENT/SERVER EVANGELISM

Bandrowski sees the rise of client/server technology within Sara Lee as an "evolution, not a revolution." Different divisions are at different stages in their migration to client/server configurations and are free to make the move at their own pace.

Where applications have already been moved from mid-range or mainframe hardware to LANs, Bandrowski says there has been 50% or more savings in hardware, software, maintenance and support.

Million-dollar mainframe-based human resources applications are being equaled by LAN-based versions costing $50,000. The company has also saved hundreds of thousands of dollars by implementing client/server applications in the areas of manufacturing, shop floor, distribution and inventory. Bandrowski believes that it takes one-quarter the amount of time to develop from scratch a reliable, easy-to-use client/server application than it does to develop the equivalent on a mainframe.

LEARNING FROM MAINFRAMES

Bandrowski also vehemently argues against the client/server backlash in some areas of information systems (IS). He says those who still argue in favor of mainframes because of their unique qualities are "uninformed and haven't properly taken advantage of the new technologies." Yet users implementing client/server technology have a lot to learn from mainframes, he adds.

It is important, Bandrowski says, that there be "cross-pollination" between the ideas embedded in mainframes and those embedded in LAN-based technologies. It's absolutely desirable for users implementing client/server technology to apply mainframe concepts to LANs. For instance, critics say LANs aren't as reliable or secure as mainframe-based networks, yet Sara Lee has done it, Bandrowski says.

"How many people have disaster recovery plans for LANs?" Bandrowski asks. "We do!"

The off-site disaster recovery services that Sara Lee has for its LANs costs anywhere from one-tenth to one-thirtieth of what the equivalent protection would cost for a mainframe, according to Bandrowski. Similarly, Sara Lee has built LANs that use Redundant Array of Inexpensive Disks (RAID)-based fault tolerance, error-correcting memory and duplicate servers to provide mirroring functions equivalent to those of a mainframe. Consequently, and contrary to many net managers' experiences, Sara Lee has LAN servers that have never been down in 1 1/2 years.

Sara Lee Corp.

Ranked 33rd on the Fortune 500 list of largest U.S. companies

Annual sales: $14 billion

Products: Hanes/Leggs hosiery, Coach leather goods, Jimmy Dean sausage, Kiwi shoe polish, Aris gloves and Playtex feminine products

Another mainframe concept applied to the client/server architectures in Sara Lee divisions is the notion of the secured glasshouse. In this approach, an organization's computing resources, such as servers and shared-disk storage devices, are centralized. "Distributed computing doesn't have to mean distributed computers," Bandrowski says. "Most companies need centralization of net resources."

Bandrowski acknowledges that functions such as security and fault tolerance "aren't as easy [to install in a client/server environment] as with a mainframe because they're not built into the operating system." However, he says, "client/server applications are designed more for flexibility and modularity. It's a matter of attitude. How secure or fault tolerant do you want to be? It's not technology but how it's implemented that matters."

Part of Sara Lee's ability to learn from mainframes revolves around having a single IS organization. It has no separate net group. Instead, LAN and mainframe specialists are grouped together for cross-training, with no adversarial relationship between the two.

Continued on page S11

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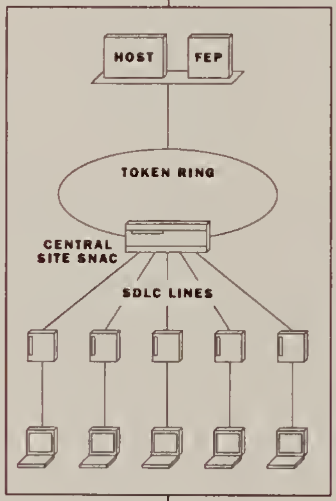

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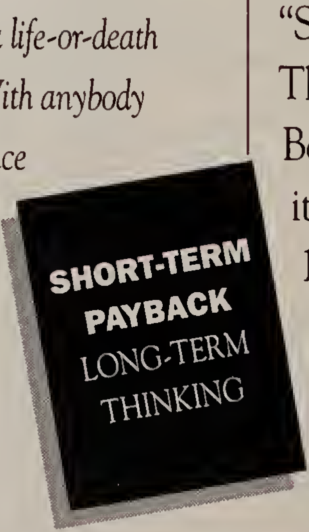

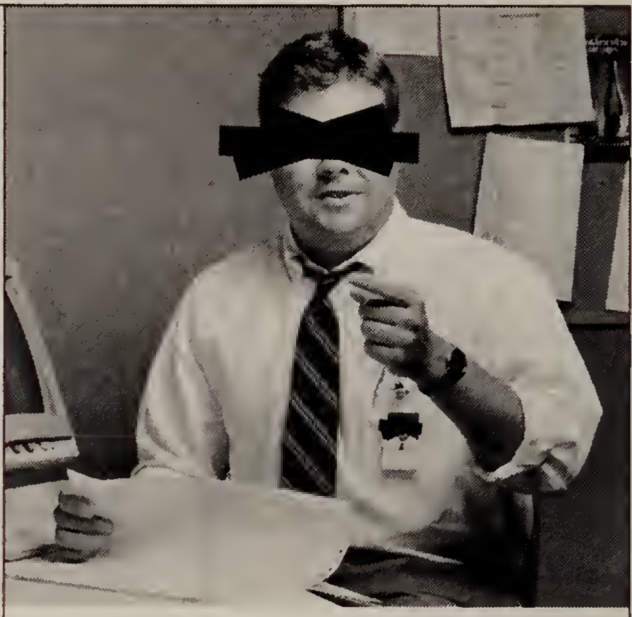

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Continued from page S9

"Both groups know lots of good things and are responsive to all technologies," Bandrowski says.

NETWORK SPECIFICS

Although much of what is learned from mainframes can be applied to client/server environments, mainframes weren't designed to handle some of the problems encountered in the client/server world.

Take net management, for instance. Since client/server architecture brings more disparate elements onto nets, management is more difficult than in a mainframe world. For example, client/server environments require workstations that utilize graphical user interfaces (GUI) to display the icons of the disparate net elements. They must also be able to dynamically reconfigure net maps and manage routers.

GUIs, dynamic network map reconfiguration and router management were never part of the management package for a mainframe-based network.

Another new element in the network are laptop computers employed by remote users, especially salespeople. These users have software such as Qubix Corp.'s Distributed Communications Server and Novell's Access Star that enable them to tap into a LAN from a remote location.

As a major electronic data interchange user, Sara Lee is also working to integrate EDI messages with voice, data, fax and IBM Systems Network Architecture traffic on the same network circuits. Efforts to add imaging and multimedia to the mix are getting under way.

Sara Lee is already routing LAN traffic over links originally set up to carry SNA traffic, which is encapsulated in Transmission Control Protocol/Internet Protocol packets. Piggybacking LAN and SNA traffic on the same circuit, rather than purchasing separate circuits for LAN traffic, saved the firm enough mony to effectively pay for the routers needed to support the internets.

Despite improved efficiencies and flexibilities, Bandrowski believes there is still room for improvement in client/server technology.

The amount of off-the-shelf client/server applications has to increase, he says. Many off-the-shelf applications, such as investor relations and shareholder accounts, are still available only on mainframes.

"We don't want to develop [applications] if we don't have to," Bandrowski says. In fact, some Sara Lee divisions are keeping mainframes going solely because they run a limited number of vertical applications that as yet are not available in the client/server world.

Likewise, the cost for wide-area transmission has to drop, he says. Wide-area network costs are still prohibitively high, which limits access to distributed applications.

Finding qualified client/server experts must also become eaiser. High-quality system integrators familiar with the intricacies of client/server technology are not that easy to locate. "If one is good in one area of the country, it may not operate in another area of the country," Bandrowski says. This causes a dilemma for a company with such geographically dispersed operations as Sara Lee.

Many corporations, including Sara Lee, are also finding it difficult to integrate all of the different kinds of E-mail packages in use. This is compounded when public E-mail services such as MCI Communications Corp.'s MCI Mail and GE Information Services' BusinessTalk are used. Bandrowski cites the lack of commonality and lack of a common addressing scheme as problems awaiting solutions.

LANs must also become more scalable. NetWare's current limitations can present problems for firms like Sara Lee. Intel Corp. processors on NetWare servers can only offer so much performance.

"If you top out on an Intel box, you're done," Bandrowski says. Instead, it would make more sense to start investigating the possibility of using servers with multiple processors that can offer more performance and run Unix.

There also has to be improvements in how easily different hardware and software can be integrated. Bandrowski says platform independence and application portability are bunk.

It's not as easy to integrate different hardware and software platforms as vendors that want to capture the client/server market say it is. And, sometimes, the best solutions are only available on specific platforms.

Lastly, there are training and education requirements. The client/server way of doing business requires a committed corporate effort.

"It takes time for people to absorb new ways of doing things," Bandrowski says. "You have to be more intelligent, you have to be more educated. You need your own in-house research and development group that can ask vendors better questions, such as whether this application program interface works with that protocol, as opposed to accepting a statement that says a vendor supports that protocol. With client/server, it's more difficult, but it's more flexible, and it's worth it."

⊸ Borsook is a San Francisco-based free-lance writer specializing in computers and communications. She can be reached via the Internet at loris@well.sf.ca.us.

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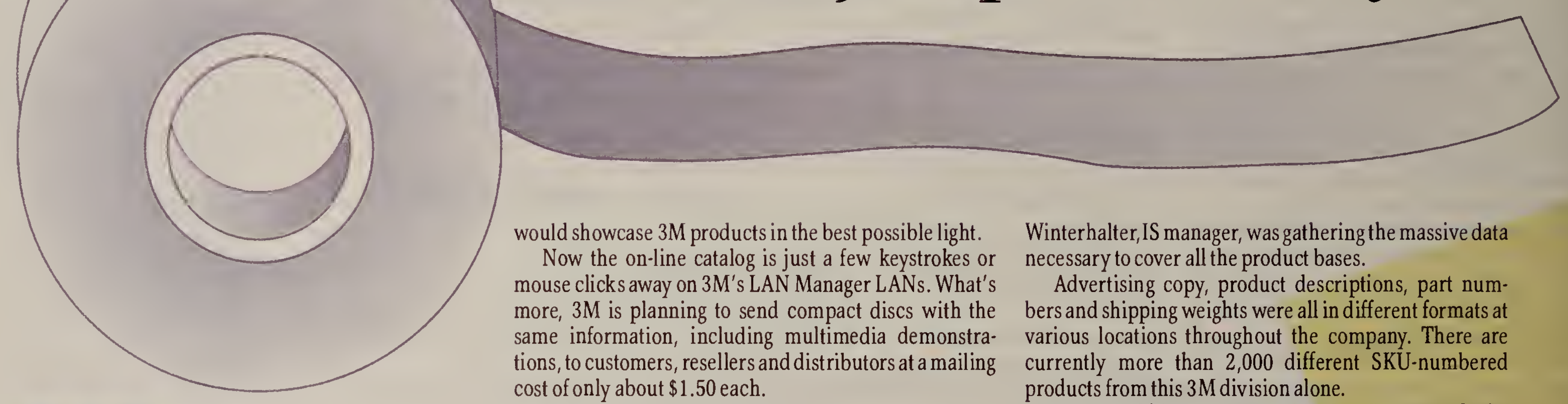
Circle Reader Service #7

3M makes multimedia an office staple

BY KRISTIN MARKS

LAN-based office products catalog uses multimedia to make wares jump out at buyers.



The company responsible for such indispensible office staples as Scotch Tape and Post-it Notes is at it again. And like previous efforts, the folks at 3M Co. are hoping their latest idea sticks around for some time.

With mailing costs running at $5 per copy — not to mention paper and production costs — executives at 3M's Commercial Office Supply Division figured there had to be a more efficient way to distribute the unit's 5-in. thick catalog of product information, a veritable bible for sales staff, distributors, resellers and customers.

So executives sat down with information systems (IS) staffers and hammered out a plan to bring the product catalog to life by creating a local-area network-based CDROM version employing multimedia technology that would showcase 3M products in the best possible light.

Now the on-line catalog is just a few keystrokes or mouse clicks away on 3M's LAN Manager LANs. What's more, 3M is planning to send compact discs with the same information, including multimedia demonstrations, to customers, resellers and distributors at a mailing cost of only about $1.50 each.

CATALYST FOR CHANGE

The catalyst for this development project, according to Dan Bauer, marketing communications supervisor for 3M's Commercial Office Supply Division, was a recent business study that showed three major market trends: rapid change, a turbulent economy and changing economic conditions. Twenty-five percent of the division's revenue comes from products that are less than five years old.

With 3M's ever-evolving product line, keeping customers updated became a Herculean task. In addition to the thick product binders, brochures, catalogs and product update mailers regularly descended upon customers, resellers and distributors. All of this paper usually ended up either on a shelf or in a wastebasket. And while many 3M customers attest to the convenience of having the product catalog within arm's reach, most still call the company to talk to a customer service representative because it is faster and easier.

So 3M decided to meet the challenge of their customers' expectations head on by providing information at their fingertips.

The hardest part of the project, according to John Winterhalter, IS manager, was gathering the massive data necessary to cover all the product bases.

Advertising copy, product descriptions, part numbers and shipping weights were all in different formats at various locations throughout the company. There are currently more than 2,000 different SKU-numbered products from this 3M division alone.

Bauer and his group met with IS to first identify the available tools that would allow them to collect all the changing product data and disseminate it to customers. The systems people did a bit of research and came back with some ideas.

Unlike many other organizations, there doesn't seem to be any friction between the IS department and the user community at 3M, Bauer says. "We view the systems staff almost as part of our department."

Once the storage limitations of diskette-based solutions became evident, the systems group suggested CDROM. The next step was to find someone to help define the software tools.

"Microsoft [Corp.] was very helpful in this respect," Bauer says. "And we found a couple of good consultants to help out with the multimedia components."

The catalog application now contains everything except product inventory levels from the Commercial Office Supply Division. The application is organized into categories represented by icons. Users can search for items across the entire product line, as well. A user, for instance, perusing the overhead projector line is bound to stumble across a product description for a unit that folds

Continued on page S17

ANNOUNCING
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AND
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MULTI
NETW

Northern Telecom introduces the Magellan Gateway broadband multimedia switch. It's not just another ATM switch, or another switch in the network. Because conventional networking solutions won't address emerging multimedia requirements.

We talked to network users and to the biggest players in networking and found out what they needed. And what they needed wasn't more technology, it was greater flexibility and broadband multimedia capabilities.

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What do we mean by broadband multimedia? In short, it's a new generation of networks and applications that use intelligent, high-speed, high quality transmission and switching technology to deliver voice, data, video, image or multimedia communications. And it directly answers the needs of both network operators and users.

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By controlling traffic and services dynamically across all network layers, MPS lets a network operator manage various types of traffic simultaneously, and price different grades of service selectively. So you can

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deploy network resources and capabilities where you need them most. Broadband multimedia networks will meet the user demands for enterprise networks, backbone carrier networks, integrated community networks (for applications like distance learning) and residential networks (with video dial tone and home shopping).

Now we're delivering the products to make our plan work. Our Magellan Gateway broadband switch provides concentration and switching for core networks and has the flexibility to handle several network layers. For example, you can deploy our new Magellan Gateway as a network transport switch, then, as capacity demands grow, transform it into an access switch in the network access layer. It can also serve as an on-premise access switch for a large enterprise network.

Our previously announced Magellan Passport enterprise switch also adds flexibility to any corporate network. It combines the bandwidth efficiencies and cost-effectiveness of frame switching with the voice and video capabilities of cell switching. It can also serve as a carrier access switch. And with the introduction this fall of a backbone network switch, we'll offer the widest portfolio of broadband multimedia products and capabilities in the industry.

So this isn't really the end of ATM, it's the beginning of a better way to use the capabilities of ATM – broadband multimedia networking. To find out how you can benefit from a broader perspective, call 1-800-NORTHERN (press 1 and ask for extension 201).

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Circle Reader Service #3

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Circle Reader Service #4

Continued from page S12

down in such a unique way, it's patented. Users know the device is patented because a sound clip tells them so.

In addition, an animated graphic shows the patented movement of the overhead projector in action. A hand appears on-screen and demonstrates where the spare light bulb is kept. Also, the carrying case floats in from out of the frame to display what the unit looks like when it is packed up. The product brief includes the description, order number, three versions of advertising copy, as well as a Features, Advantages and Benefits screen that explains why a viewer would want to buy the product.

3M Corp.

1992 revenue: $1.154 billion

Number of employees: 89,600

Products: automotive, building, business, health care and consumer products, recording materials, photo and graphic arts, data processing products and chemicals

All this material is available for cutting and pasting across the network into other Windows applications for use in 3M customers' own marketing materials. 3M also conveniently bundled in a facsimile order sheet for each product that can be directed to a laser printer or faxed directly to the purchaser via modem.

ATTENTION GETTER

The multimedia components of the LAN-based catalog are especially effective in sales demonstrations. Currently, only about 20 products have video and audio components as part of their description.

"We showed this application to lots of people, but when we finally put the sound board in the PC we were showing it on, we got everyone's attention," Bauer says. "We showed it without sound, and viewers just weren't as excited. We have a generation that's 20 to 30 years old. When you go in and show it to that age group, the application makes sense to them. They grew up learning this way, and most of the people at the order desk fit into this age group."

When the Commercial Office Supply Products Division first took the network-based catalog to customers, it was prepared to help them install LANs to support the effort.

However, all seven companies in its first group of beta users gladly got their own nets up and running to support the application. Most 3M product dealers already had LANs in place or people on staff who had started experimenting with multimedia.

"When we finally put the sound board in the PC we were showing it on, we got everyone's attention," Bauer says.

"This willingness to invest in the platform themselves was great," Bauer says. Once the test period is over and all the kinks have been worked out, the application will be this available to virtually all 3M customers.

"Originally, we thought we might have to support the dealers technically and even get them up and running. But they all said they'd do it themselves. We're providing an 800 number for technical support," he adds.

INSIDE JOB

Currently, the network-wide catalog is being used by 3M's internal sales force and a portion of its field sales representatives. The application runs on LAN Manager networks across Ethernets wired via 10Base-T cabling. Fiber is used between routers only. Due to limitations of CDROM jukebox technology, 3M decided to put CDROM drives on each user's workstation.

Winterhalter decided against placing a CD jukebox on the file servers to avoid contention issues. CD jukeboxes function like music jukeboxes that play one song at a time. Multiple users would not be able to access multiple data sets concurrently with a jukebox.

So 3M decided to put substantial computing power on each user's desk. Each user has a high-powered personal computer with an internal CDROM drive that is used for multimedia applications.

Workstations are linked over the network to IBM Personal System/2 Model 95s running Microsoft's LAN Manager, which provides file services. Back on users' workstations, Windows for Workgroups provides peer access to data on other users' systems without going through the Model 95 server.

Winterhalter estimates that multimedia has penetrated 2% of the organization but adds that there will be multimedia on every desktop in the near future.

Of the 100 sales reps 3M has in the field, about 25% have multimedia systems in their homes as part of a "virtual office" concept being implemented. The idea of the virtual office is that people in the field need more power and disk space than people in the corporate offices because everything remote users need has to be accessible from the single machine.

The standard for the virtual office is the IBM Ultimedia Model 77 microcomputer system, which comes with built-in speakers and a sound board. The unit is an 80486-based machine running at 33 MHz and has a 200M-byte Small Computer System Interface drive, an Extended Architecture-CDROM drive, a 16-bit audio card with a Music Industry Drive Interface (MIDI) synthesizer playback and a 16-bit eXtended Graphics Array-2 noninterlaced graphics adapter that includes 1M byte of random-access memory.

Today, these virtual office workers dial into VAXes via 2,400 bit/sec modems. But the relatively low-speed dial-up devices will be replaced with 14.4M bit/sec external fax/modems that will feed into a Windows for Workgroups Remote Access Service server, which will tie into a Windows NT server.

Field reps' notebooks are being adapted to establish a wireless hookup with the desktop systems in their home offices. Because of the nature of the application, CDROM-based presentations can be exported to a DOS file for transfer to the notebook. The notebooks all have Logitech, Inc. Audio Man sound systems so that 3M reps can run multimedia presentations off the notebooks.

DRILL DOWNS

Once the Commercial Office Supply Division obtained upper management buy-in on the project, staffers started creating storyboards. A storyboard is a prototype of screen layout and hypertext links. 3M refers to this process as a "drill down."

After numerous meetings, the two teams determined which links should be included in product overviews and what information should be conveyed in a product screen, drilling down to the finest detail of each product — including shipping costs.

The hypertext links act as a type of cross-indexing to allow the user to skip around the information.

The idea of the virtual office is that people in the field need more power and disk space than people in corporate offices.

3M built a prototype that saved product data in Microsoft Word in Rich Text Format (RTF), which is the file format that Microsoft Viewer imports and then presents through Viewer.

When 3M started this project, LAN Manager was deployed in about 75% of its departments. SQL Server was also already in use. So, rather than jump to a completely new programming environment, developers compiled all the data in an SQL database, where it is stored as elements in a DOS file.

"We take Microsoft's Visual Basic and use it to access an SQL Server, which outputs the file in RTF format. The RTF file has pointers to the DOS elements," Winterhalter says. "Then the RTF files are pushed through Microsoft's Viewer. Viewer is acting like a printing press. It takes the RTF files and turns them into an electronic book. Basically, the application is a library of products."

L. to r.: Dan Bauer, Al Marlor, Andy Lamberson, John Winterhalter

One programmer worked approximately four months building the SQL Server database. A second programmer worked for about six months finishing the application, but Winterhalter estimates only three of those months were spent actually programming.

The cost of a 5-in. catalog is $5.00 per copy, while the cost of a multimedia catalog is $1.50 per copy.

"This is not rocket science," he says. "What we're doing here is simple. As soon as people realize that, there's going to be a multimedia explosion." The entire project development cycle ran 18 months.

Winterhalter says 3M was lucky to find Paul Burtness, one of the project's principal programmers. Burtness is a writer and director who happens to have a knack for programming, too.

"He understands there are unique requirements for developing video for Windows," Winterhalter says.

"There is a special knack for videotaping for use on the desktop as there are significant limitations with running video under Windows. There is going to be a significant opportunity in the long term for production houses that understand how to do this," he says.

Because Video for Windows clips generally are only 320-by-200 pixels and run, depending on the hardware, at less than 24 frame/sec — which is the frame speed films run at — the images appear choppy when there is a lot of movement.

So video shot for use inside Windows needs to have very simple frame formats and limited movement.

BUCKING CONVENTION

"This application has made us better managers of our information," Winterhalter says. Although the library of information is not considered mission-critical, 3M keeps current copies safe at a headquarters site and at the company's outside advertising agency's office. Once a week, both systems are updated and backed up on 8mm tape.

But while the application may not be considered mission-critical for 3M, its dealers have a different perspective. "The dealers are so excited that they want it as soon as possible. They see it, they like it and they want it," Bauer says.

Although a recent informal survey of industry pundits indicates that multimedia on LANs don't work and have no practical business applications, 3M has blazed a path through unchartered multimedia waters that other companies are sure to follow, making it clear that this LAN-based application will stick around like other 3M product cousins.

Marks is a consultant who specializes in multimedia at Networks Are Our Lives, Inc., a Scarsdale, N.Y., consultancy. She may be reached via CompuServe at 72240,424.

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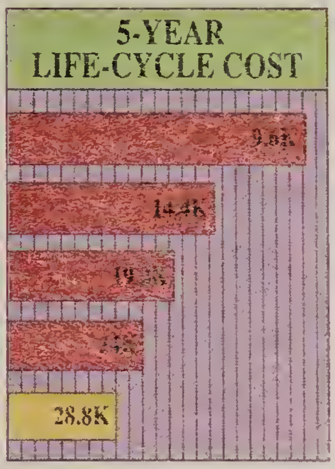

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"SEE US AT TCA-93, BOOTH #1100"

Circle Reader Service #6

Physician, heal thyself

BY PAUL KORZENIOWSKI

Brigham & Women's Hospital prescribes downsizing as treatment for its own ills.

NEIL MACDONALD

In 1988, long before the terms "downsizing" and "client/server" became the hot buzzwords they are today, the information systems (IS) department at Brigham & Women's Hospital in Boston embarked on an ambitious five-year mission. The hospital's goal: to downsize an extensive information system with 90 minicomputer-based applications to a large personal computer local-area network with 4,000 workstations and 100 file servers.

The decision to downsize was in line with the hospital's historically aggressive IS strategy. "The hospital has a well-earned reputation for being a technology leader," notes Robert Beckley, director of technology planning at Brigham and Women's.

For instance, in 1982, the hospital farmed out its IS function — before outsourcing became a fashionable option. In 1988, however, the hospital brought its IS function back in-house and began exploring the risky option of downsizing.

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What prompted the hospital to take the risk? The Data General Corp. MV series minicomputers that supported Brigham & Women's were about to run out of gas.

In use since 1983, the computers could support approximately 2,000 users and process 33 transactions per second. However, the hospital's user population was about to swell to 5,000 and the number of transactions was set to grow to 100 per second as a result of an IS revamping.

Recognizing that the DG minicomputers would not meet its requirements, the hospital examined alternatives: a higher performance DG minicomputer, a Digital Equipment Corp. VAX cluster and a PC LAN consisting of an IBM Personal System/2 running LAN Server.

Tests demonstrated that the LAN could support the hospital's applications at a fraction of the cost of the other systems. PC-based file servers sold for approximately $10,000, compared to $500,000 for the minicomputers, according to Beckley.

In addition, adding fault tolerance to the PC-based file server costs considerably less than adding similar amenities to the minicomputers. Finally, the PC LAN works with standard off-the-shelf database and word processing software, which is less expensive and easier to maintain than minicomputer packages.

"We wanted to move to areas of 'commoditization' so we could take advantage of quickly changing technology," says John Glaser, the hospital's vice president of IS.

In addition to installing new hardware, the hospital planned to improve patient care by consolidating information in a central database management system, which contains data that applications throughout the hospital can access.

For example, the centralized DBMS allows the system to automatically determine if a patient is allergic to a recommended medication and alert the doctor. Previously, such a mistake was found only if the patient mentioned it when picking up medication.

TRIAL AND ERROR

Opting for LANs set the hospital on a path of trial-and-error that constantly tested the limits of PC technology.

Brigham & Women's Hospital

Annual inpatient visits: 36,000

Annual outpatient visits: 350,000

"The software and hardware we needed would arrive in stores a month or two after we had finished our development," Beckley says. "We seemed to be one step ahead of everything."

One early decision was to choose a limited number of technologies. James Marra, manager of network services at the hospital, says. "We knew we would not be able to offer the same suite of services on Macintoshes and Unix computers, so we didn't do that." The hospital, therefore, limited itself to DOS-based PCs.

Another initial decision concerned LAN wiring. In 1989, the Ethernet 10Base-T standard was just emerging. 10Base-T was enticing, but the hospital shied away from it because it was new.

"We had enough alpha and beta products that we did not want to worry about the wiring," Beckley says. So the hospital opted for a wiring solution that was well established — IBM Token-Ring Networks.

That decision proved to be a good one. "Token-ring LANs cost more than Ethernet LANs, but the token-ring network just sits there and works, so we have been quite pleased with it," Beckley says.

Moving applications from the DG minicomputer to the LAN was challenging. The minicomputer applications were written in the Meditech Interpretative Information System (MIIS) programming language, which is commonly used in hospitals. Therefore, Brigham and Women's had to find a PC DBMS that worked with MIIS — an impossible task.

However, DataTree, Inc. of Cambridge, Mass., offered a product called DT Enterprise, a DBMS that supports Massachusetts General Hospital Utility Multiprocessing System (MUMPS), which is similar to MIIS and also a hospital industry favorite. An additional enticement was DT Enterprise's windowing interface that runs on MS-DOS, which gave the hospital the benefits of Windows without having to work with another new technology.

MUMPS relies on IBM's Network Basic I/O System network protocol, a requirement that meant the hospital had to use IBM's LAN Server as its LAN operating system — a selection that created problems.

Brigham & Women's used LAN Server for about nine months, but according to Marra, LAN Server was buggy and lacked functionality, such as speed and third-party support. For example, the hospital had trouble installing it and getting device drivers to work with it.

While discussing the situation with IBM, the hospital discovered it could run NETBIOS on Novell, Inc.'s Internetwork Packet Exchange (IPX) protocol. So the hospital switched to Novell's NetWare, a decision that gave them access to more third-party tools. Other benefits of using NetWare were faster processing speed, better fault tolerance and less use of client and server memory.

The hospital wanted to move application processing functions off central servers to client workstations. Initially, the hospital planned to use for its client computers IBM PCs with Intel Corp.'s 8086 microprocessors operating at speeds of 12 MHz and having 640K bytes of random access memory.

The hospital soon found it needed more processing power. "Running a windowing interface on a PC sucked up processing power," Marra says.

Luckily, PC prices were dropping and power was increasing, so the hospital was able to outfit IBM PS/2s users with 80386 microprocessors that operate at 25 MHz and have 4M bytes of RAM.

The hospital, however, had problems with using IBM hardware. It was expensive — even though competitors such as Compaq Computer Corp. were aggressively cutting their PC prices, IBM was slow to follow suit.

Third-party support was another issue. Although IBM's Micro Channel Architecture (MCA) had elegant technical features, the number of third-party devices with MCA support was limited.

With the Compaq machines, the hospital could select from several Redundant Array of Inexpensive Disks (RAID) products, but found none that worked with the IBM servers. So, about 18 months ago, the hospital switched to Compaq ProSignia PCs equipped with Intel 80486 microprocessors operating at 25 MHz with 4M bytes of RAM.

Because purchasing hard disk drives for each user was cost-prohibitive at the time, the IS department decided to have users boot their applications over the network rather than store them on local hard drives.

That decision had both advantages and disadvantages. On the plus side, the IS department didn't have to train employees to replace faulty disk drives, and it didn't have to put software distribution mechanisms in place so all employees work with the same package.

On the minus side, NetWare's Remote Program Load (RPL) option caused problems. RPL is a NetWare feature used with diskless PCs that allows applications to be loaded from the server onto the client, rather than the client booting them itself.

One version of RPL was impossible to implement because the hospital would have needed to add .5M byte of RAM for each workstation on each server, a requirement that translated to .5G bytes of extra storage for each server. Novell fixed the storage problem with a new release, but according to Beckley, the package created problems that could not be easily identified or duplicated.

The hospital's five-year plan involved moving 90 minicomputer applications onto PC LANs. Migrating each application required a three-stage process: prototype, limited deployment and full deployment.

Because MUMPS is a niche technology, the hospital had to ferret out application development tools — a task that had varying degrees of success. Brigham and Women's engaged in a codevelopment project with a vendor, but ultimately discovered that the hospital's goal of getting a computer-aided software engineering (CASE) tool was not consistent with its partner's desire to build an application generator that was more of a front-end development tool.

Fortunately, the hospital found Science Applications International Corp.'s HyperM, which is similar to Microsoft Corp.'s VisualBasic programming tool, and used it to design windowing screens.

The hospital found rewriting the applications daunting. Enter Polylogics, Inc., a New York consulting firm that had developed a tool to convert DG minicomputer MIIS applications into PC MUMPS applications. Polylogics had developed the software for one client and turned it into a commercial product.

A major plus was that the PC applications looked identical to their minicomputer brethren, only they ran faster. "Our users were quite happy. They did not have to go through training to use [the applications]," Beckley said.

DO IT YOURSELF

The hospital also did some custom development. For instance, the IS department designed a naming service and integrated it with NetWare. The service lets users log on to the network rather than on to a specific server. After a user logs on, the screen presents a list of all available applications.

In addition, the IS department developed network management tools. One such tool reports on the health of all nodes, servers and workstations. A second automates the process of adding new users. The program automatically generates all logon scripts, user identifications and passwords an employee needs to access specific applications.

Approximately 20 applications, including accounts payable, clinical, general ledger, order entry and radiology, run on the hospital's NetWare LAN, which consists of about 50 LAN segments connected by bridges.

Through a gateway, PC users can also access certain DG applications that haven't been downsized yet. During the next few months, accounts receivable, chemistry and hematology are scheduled to move to NetWare servers. The number of LAN users has grown to 2,000 users on approximately 50 Token-Ring LANs in 14 buildings. The hospital has installed IBM wiring hubs and uses fiber cable and IBM bridges to connect the hubs into a collapsed backbone network.

Laying the wire was not simple and, in at least one case, required some creative problem solving: The hospital hired a German Shepherd to pull a cable through a narrow passage.

The central DBMS is stationed on 27 servers, each with 2G bytes of storage. The hospital has left room for expansion, too; currently, 37G bytes of the available 54G bytes of storage are in use.

Marra says he made one mistake: failing to adopt Microsoft's Windows operating system quickly enough. The hospital thought Windows 3.0 was not yet ready for prime time but has been impressed with Windows 3.1. The hospital is starting a pilot project to run its PC applications under Windows and expects to roll them out during the next 12 to 18 months.

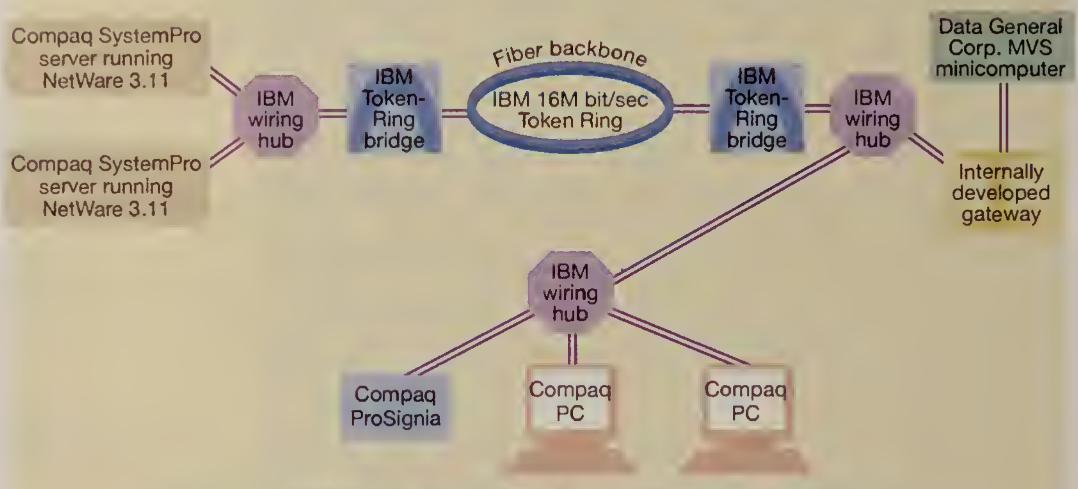
The bulk of the hospital's minicomputer applications should be moved in 12 months, and all applications should be running on NetWare servers in 18 months.

Thus far, the IS department has been able to remain close to its initial cost estimates.

"We are less than 10% above [what we] estimated on our original spreadsheet," Beckley says, adding, tongue in cheek, "It's scary that we are still being measured against it."

Korzeniowski is a free-lance writer in Malden, Mass., who specializes in networking and data communications topics.

Brigham & Women's LAN prescription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Data General Corp. MVS minicomputer
Internally developed gateway
IBM wiring hub
Compaq ProSignia
Compaq PC
Compaq PC

IBM wiring hubs and bridges connect approximately 50 Token-Ring LANs in 14 buildings to a collapsed backbone network.

GRAPHIC BY SUSAN SLATER

SOURCE: BRIGHAM & WOMEN'S HOSPITAL, BOSTON

Realtor tracks client needs via client/server net

BY HOWARD BALDWIN

CHUCK POTTER

CB Commercial's agents use net's new flexibility to close sales in a tight market.

Few industries have been hit harder by the recession than commercial real estate. One recent survey calculates a 19.3% vacancy rate in commercial buildings for the first quarter of this year, up from 17.6% a year ago. Consider that in 1980, vacancy rates hovered well below current levels at about 5%.

With so much empty space to be had, competition in the commercial real estate sector is fierce. Real estate firms like CB Commercial Real Estate Group, Inc. of El Segundo, Calif., work feverishly to stay on top of accounts, scrambling to match client needs with available office space in a flash.

So instead of standing pat in a tough market, CB Commercial is forging ahead with ambitious plans to totally rearchitect its core business applications by the summer of next year, relocating them from hosts at a corporate data center to local-area networks in the company's 80 offices in 35 cities nationwide.

CB Commerical Real Estate Group, Inc.

1992 revenue: $350 million
Number of employees: 4,800

In addition to the office LAN undertaking, CB Commerical has launched an effort to build a new wide-area network utilizing frame relay services and Integrated Services Digital Network to tie the remote sites into an enterprisewide backbone network.

EMULATING A TREND

When Sears, Roebuck and Co. bought Coldwell Banker Real Estate Group, Inc. in 1989, it kept the residential real estate division and divested the commercial real estate division, which became CB Commercial. The lion's share of CB Commercial's business involves buying, selling and leasing office buildings. About 5% of its business involves financing and appraisals, according to Afshin Khoddam, CB Commercial's manager of information technology. It is now the largest commercial real estate firm in the country, with 4,800 employees and 1992 revenues of $350 million.

CB Commercial is forging ahead with ambitious plans to totally rearchitect its core business applications.

Currently, each of the 80 real estate offices is linked via a dedicated connection over an Advantis value-added Systems Network Architecture network to an El Segundo data center supporting an IBM 4381 mainframe, which runs a Computer Associates, Inc. CA-IDMS. CB Commercial's brokers access data on the mainframe via 3270 terminal

Continued on page S22

OUR TOOLS.
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Microsoft has set the standard for personal computing over the last decade. Our goal for the '90s is to work with large corporations, ISVs, solutions providers and end-users to help them develop complete solutions using Microsoft products, and provide them with superior technical product support. Look for us at Networld and find out more about joining our expert team.

Market-Driven.

Microsoft's Seattle-based **Solutions Marketing Group** is forging global alliances with key trade groups, ISVs, consultants and strategic integrators to satisfy the needs of the market. And what it needs right now are sharp marketing professionals who have built a strong leverage model and know how to create innovative marketing programs to achieve great levels of success for our third party allies. We are building world-class programs in educational services and training centers, vertical developers' relations, and technical information products like the Microsoft Developer's Network and Microsoft TechNet. Positions available include:

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- **Corporate Networking Support Engineers (Dept. 8955)**
- **SQL Support Engineers (Dept. 8927)**

Microsoft End User Support provides product information to clients via telephone and on-line services. Positions available include:

- **Application Support Engineer (Dept. 8971)**
- **Operating Environment Support Engineer (Dept. 8968)**

For the above positions, please send your resume and salary history to: **MICROSOFT CORPORATION, Attn: Human Resources, (Insert appropriate Dept.#), 1321 Greenway Drive, Irving, TX 75038.** No phone calls please. We are an equal opportunity employer and support workforce diversity.

Microsoft®

Continued from page S21

emulation on their personal computers.

The application, called Property Information Management System (PIMS), keeps track of basic building information — age, square footage, cost per square foot, vacancy and contact person, among other data.

In an ongoing rollout, CB Commercial is installing NetWare 3.11 LANs, with an upgrade to NetWare 4.0 planned for 1994. By year end, half of the 80 offices will have 33-MHz, 486-based PCs with two Compaq Computer Corp. SystemPro or ProSignia servers — one set up as a file server and the other as a database server. More than 30 of those offices have already started using the client/server applications that will replace PIMS.

Under the new scenario, brokers can set up presentations and data to accentuate information that may be more crucial to a specific client.

"The issue is access to data," says database administrator Ramon Martinez, a 12-year mainframe veteran. "We are taking those mainframe applications and downsizing them to the local level."

BREAD-AND-BUTTER APPS

The PIMS application is being replaced on the database servers in each office by an application called Professional Real EState TOols (PRESTO). According to application developer Froilan Temio, the company is taking the same elements of PIMS and writing PRESTO to use Gupta Corp.'s SQLBase database management system, which handles data maintenance in SQLWindows and data reporting through Sybase, Inc.'s Quest data access tool.

PRESTO, which runs as a NetWare Loadable Module, supplies agents with bread-and-butter real estate functions, such as query, reporting and data maintenance of commercial office space. "The advantage is the agent uses a Windows interface as opposed to 3270 screen formats," Martinez says. "Since the server is local, the turnaround time on requests is much quicker."

CB Commercial still plans to keep PIMS around, largely to house data more national in scope.

Moving from a host-based application to client/server technology has boosted the agents' flexibility in both accessing and using the data. CB Commercial's technical crew believes this is key to productivity and competitive advantage.

While brokers have access to the same type of data on the servers as they did on the mainframe, the difference lies in the way they can present this information to clients. The most common complaint with the old setup was that brokers could only get finished reports — not raw data — from the mainframe.

"The PIMS reports look like they came from a mainframe," Temio says. "They're character-based [and printed] in one font."

Under the new scenario, brokers can set up presentations and data to accentuate information that may be more crucial to a specific client. "Showing raw data isn't as effective as it used to be," Khoddam says. But using software such as Microsoft Corp.'s Excel spreadsheet and Lotus Development Corp.'s Freelance Graphics presentation software helps "present deals to the client in a more effective way. [With the data in] the server, you have more flexibility to massage the data and make it a presentable format. PRESTO is putting us in a position to do this in every office," he says.

Local file servers will also support WordPerfect Corp.'s WordPerfect and Real Estate Assistant, a client contact management package that tracks addresses, phone numbers, and agenda or action items for pending deals. Other custom applications use Excel to tally brokers' productivity in earnings, in terms of their office or region.

For those offices already using client/server technology, Temio says, "We wrote some utilities that would transfer their transactions to the mainframe. That's done [overnight] on a daily basis."

Synchronization of local data with the host database is inconvenient because it's not automated — local personnel must initiate the data transfer. A user in one of the offices has to type a command to execute a batch file.

"If a user fails to do that, that's a drawback," says Temio, who is working on a way to automate the process. Plus, data at the corporate site is only as current as the previous day.

Temio also acknowledges, "A lot of our challenges have to do with going back to the mainframe and getting the two platforms to talk. If we didn't have to do that, it would substantially reduce [our work load]." The mainframe will continue to be used by those offices that haven't yet been switched over.

The challenge of getting the mainframe and servers to communicate will persist since Khoddam doesn't see CB getting rid of the mainframe anytime soon.

He says it will continue to be used as a repository for national, as opposed to regional, sales information.

"We still have all our financial applications running on the mainframe. But I'm sure at one point we are going to replace it."

Ultimately, CB Commercial will vacate the value-added SNA net, and the entire WAN will support a frame relay backbone with ISDN feeders to the frame relay net.

The company has carefully compared the two technologies and has found that ISDN's costs, depending on use, can be less than frame relay access fees.

"We have situations where it makes more sense [to have] several offices sharing information within their own grouping, and then accessing the frame relay network."

Some offices have only 20 brokers, while others have 120 brokers, Martinez says, adding that the larger offices lend themselves more to frame relay. "We're looking at creating regional offices to be the point of access for the frame relay network," Martinez explains. "We have situations where it makes more sense [to have] several offices sharing information within their own grouping, and then accessing the frame relay network."

Servers in the branch offices will have ISDN adapters installed and will be linked to larger regional offices that provide access to the frame relay net.

CB Commercial has set up the larger offices as collection points for transmission of data. Just as airlines feed passengers into hubs, the larger offices will collect data over ISDN links from smaller nearby offices and send it back to the El Segundo data center via frame relay over a router-based internet supporting T-1 lines.

Although Khoddam doesn't have quantifiable numbers on how the new networking system will aid CB Commercial's bottom line, he's confident that the effect will show up in black ink.

"What makes our revenues are the number of deals [the brokers make]," Khoddam says. "It's a matter of availability of information. When the brokers have more information, they can make more deals," he said.

Temio says it is more difficult to support applications at the local level.

Khoddam bases his optimism on several factors. "Our revenue from 1991 to 1992 has gone up 9%, despite the fact that 1992 was a worse year than 1991," he says, pointing out that one of the most automated offices in Phoenix is also one of the most profitable. It has seen a 70% jump in revenue over the past year.

He acknowledges that Phoenix is one of the country's least depressed real estate markets but insists, "You can contribute [its growth] to the market or the office. Each one[contributes] a share."

TRAINING, TROUBLESHOOTING

Installing so much new technology hasn't been problem free. The foremost issue for Khoddam and Temio has been training agents on the new applications.

"We have put together a [traveling] training group," Khoddam says. "We go to an office and install the LAN, and we have two to three weeks of training immediately." A month later, they schedule follow-up training sessions and then conduct them every other month to keep users up-to-date with the applications.

Nor have performance issues been resolved. Temio says, "We haven't reached a level of performance we're happy with. Database performance tuning is an ongoing project."

When agents needed a report from the mainframe, Temio adds, "they'd submit a job and forget about it. Later, they'd go back and see if it was ready," which could take anywhere from an hour to a whole day, depending on the mainframe.

But with the LAN, he continues, "when users request a report, their PC is tied to that task. That can take 15 minutes." That is faster than an hour, of course, but it's still aggravating to the agent whose PC is tied up the whole time. "It's psychological," Temio says. "Maybe the answer is multitasking and OS/2."

ON THE MOVE

The move to a client/server-based environment has also been taxing from the standpoint of technical support. Temio says it is more difficult to support applications at the local level. One advantage of providing centralized host applications is that "the computer is right here, and you can troubleshoot on the spot," he says.

With client/server, applications are distributed, and, consequently, the support expertise needs to be distributed, as well. "When you deploy on a client/server level, you would expect instead of decentralizing the platform and the apps, you'd decentralize the support," Temio says. "Well, that doesn't always happen."

He says it would be ideal to have a database administrator at every site, but the expertise just isn't available to do so. CB Commercial still relies on centralized support to walk users through problems.

Finally, Martinez says, you need to pay careful attention to the problem of capacity planning.

"At first we didn't have the right tools to do network analysis. We realized we needed [capacity planning software] to do a better design of the network," he says. Using such software helps users select the amount of bandwidth they need and the speed at which they need data to travel, Martinez adds.

But the advantages make the trouble worthwhile. Khoddam recounts the response of some of the brokers who remember a time without computers. "We have brokers who have been here 25 years. They're the ones who make the most money. They say, 'I've been doing fine without the PC, why do I need it now?,' " he says.

This is one of the toughest challenges, Khoddam says. But as the new system goes online, he's seeing a gradual transition in their attitudes. "Now they say, 'I can't live without the PC.' "

➻ A native of Silicon Valley, Baldwin has been writing about networking since 1987.

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Circle Reader Service #8

Group insurance

Johnson & Higgins finds Notes groupware essential to achieving an edge over competitors

BY JERRY LAZAR

DANILLE SWICK

In an industry usually considered slow moving and stolid, 150-year-old insurance brokerage Johnson & Higgins, with its prestigious offices on New York's Financial District, has taken a leadership role in information technology, especially in the realm of communications.

Behind the airy outer offices overlooking the East River are crowded inner offices — a maze of high-tech cubicles dedicated in part to the company's local-area network team.

This LAN team has created a constantly evolving LAN platform comprising, among other technologies, Novell, Inc. NetWare 3.11, Compaq Computer Corp. personal computers and servers, and Hewlett-Packard Co. peripherals.

So far, the company has installed LANs at about 30% of its 52 nationwide branch offices in cities such as Chicago, Los Angeles, Pittsburgh and San Francisco. The firm has pegged a large part of its success on the extensive use of Lotus Development Corp.'s Notes groupware.

In addition, the company is now piloting imaging applications, evaluating NetWare 4.0 and making ambitious plans to address the LAN needs of 40 other Johnson & Higgins offices throughout the world, in countries such as Canada and the U.K., in 1994.

The insurance brokerage is currently running pilot projects using a couple of different imaging products — IBM's ImagePlus/2 and Lotus Notes: Document Imaging (LNDI).

In the company's New York facility, ImagePlus/2 is used to scan the network documents associated with insurance policies, such as claims, premium checks and the policy itself.

The product runs on a LAN comprising 10 IBM Personal System/2 workstations using an 80486-based PS/2 Model 95 as a server with 2G bytes of hard disk storage.

In another pilot imaging project based on LNDI, Johnson & Higgins stores photographs and documents related to insurance policies for review by brokers. The pilot project is running in New York and in other offices.

"If we have someone else's document, with their letterhead and signature, we'll reproduce their document instead of retyping the entire letter," says Bill Wilson, MIS director at the company. Not having to rekey documents improves the accuracy of the information.

Wilson is satisfied with the results of the pilot projects so far and estimates that they will progress beyond the pilot stage within the next six months.

One drawback to using stored images is that they may not be considered legal copies in the eyes of the federal government.

Because of this, the company still keeps originals on file.

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Johnson & Higgins

1992 revenue: $933 million

Number of employees: 8,200

Business: Insurance brokerage and employee benefit consulting firm

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INFORMATION GROUPIES

Apart from its foray into the world of imaging, Johnson & Higgins' LAN team relies heavily on Lotus' Notes.

The LAN team considers Notes to be much more than electronic conferencing software or groupware. In fact, the company uses it as a database development system – one that is not relational and, therefore, not as powerful as many others on the market.

But Notes serves their needs. Using the product, the company has developed a sheaf of applications that run across its networks.

Known jointly as InfoEdge, these 20 or so applications indeed give the firm an information edge. "One little bit of information can be the difference between getting an account and not getting an account. It can be worth millions of dollars," Wilson says. "Our business revolves around information. We really don't have any products except for information."

Like all insurance brokers, Wilson says, the company "takes the information we have and applies it to very specific accounts and provides the best insurance program possible."

As a brokerage, Johnson & Higgins does not write insurance. Customers approach Johnson & Higgins with specific insurance needs, and the company acts as an intermediary in finding the coverage needed.

For example, a formerly bankrupt company might have trouble finding liability insurance once it becomes solvent again, while another might need temporary coverage for an executive traveling abroad. The task of the brokerage is to scour hundreds of insurers to find the proper coverage.

"Managing this information is very complex," Wilson says. "Our brokers needed a way to keep on top of the changes."

In a nonautomated environment, information is passed from the branches to the central office, which reviews the data and generates a newsletter or some other hard copy to circulate the data. "Information would always come out of the central office, even though the information you needed might be with a person in Atlanta or San Francisco," Wilson says.

The in-house applications developed from Notes, however, provide network users with information on everything from the latest coverage changes of a San Francisco underwriter to the best prices available for an approved piece of networking hardware.

Johnson & Higgins will eventually bring all 8,000 of the company's employees onto a series of LANs. But for now, the firm is concentrating on professionals such as managers and insurance brokers. "Systems and networks in the past were frequently aimed toward support staff and word processing," Wilson says. This shifting of emphasis to the professional may be unique to the industry and has changed the way the company does business.

ALL IN WHAT YOU KNOW

One important application based on Notes, Johnson & Higgins' National Casualty Information Database, has automated the brokers' search for information. Policy information supplied by the branch offices from hundreds of insurers worldwide is available to all brokers via a LAN and is disseminated companywide through hubs in New York.

"You can find information in minutes that might have [previously] taken hours, or that you might not have found at all," Wilson says.

Another application Johnson & Higgins has generated using Notes is the Market Assistance Database, which puts the expertise of all company brokers at the staff's disposal.

"Our accounts are really very complicated," Wilson says. "They are not turnkey. If they were, we wouldn't be in so much demand."

With the Market Assistance Database, "someone in a branch office can put in a request for information, and other users from throughout the company can answer questions," he says. "The way we are advertising it is: 'You have all of J&H working for you from the same place at the same time.'"

Unlike a simple bulletin board, management can track the use of the Market Assistance Database by such categories as location, insurance provider, time of day and so forth.

"The database is especially important for smaller branch offices," Wilson notes. "In New York, if you have a question, you can just call a conference and have eight gurus get together in a room with you. In the branches, they need the electronic connection."

Other information-intensive applications based on Notes include Insurer Library, which provides a financial profile of insurance companies worldwide; NewsEDGE, a third-party package that filters news into Notes based on individual profiles; and a suite of applications for sales and marketing support.

Wilson first encountered Notes at a Comdex conference almost four years ago. When he took over as MIS director in early 1990, he says, "We realized very quickly that it was the critical thing that could make a difference in the way we do business."

"For what we do as insurers, Notes is perfect," raves Bill Quinlan, Johnson & Higgins' LAN manager.

TRAVELING THE DATA HIGHWAY

You can't underestimate the importance of LANs at Johnson & Higgins, according to Wilson. "The LANs are the highways for Lotus Notes," he says.

The company's LAN program was basically built from the ground up. When Quinlan joined the firm as LAN manager, the company had a few OS/2 LAN Manager networks scattered throughout its 52 branch offices. They were not being used as effectively as they might have been, and Quinlan was chartered to create a new infrastructure.

According to Quinlan, creating a new infrastructure was easier, in some ways, than dealing with a well-established environment. Without much in the way of an existing environment, Quinlan and his team were able to create an up-to-date system that would do the job right. "We went from lagging behind our competitors to being one of the industry leaders," he says.

When it comes to new technologies, Quinlan does sound the note of caution one might expect from a major insurance brokerage. "We do not want to be bleeding edge," he insists. However, since the insurance business has a tendency to be two or more years behind on the technology curve, simply keeping current is enough to give Johnson & Higgins a leg up on most of their competition.

"We are pretty lucky," says Wilson. "We have a CIO that understands the insurance business and understands the technology and what it can do for the company. Our president is a tremendous believer, too. That is what it really takes, that kind of support from the high level."

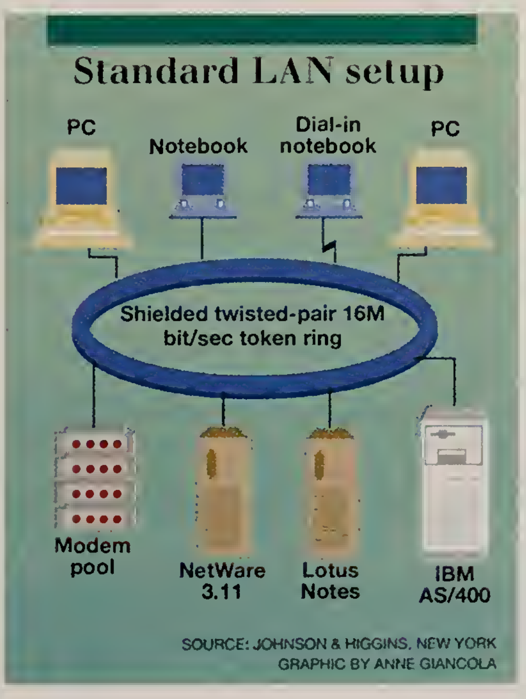
Between 1,000 and 1,200 of the company's 8,000 employees now work on about 20 LANs, while the rest have electronic mail linkages to LANs through gateways provided by Lotus. The LAN group has been adding new LANs and upgrading installed LANs as quickly as it can. The home office is currently in the process of being upgraded; with 400 users, it will be the single largest LAN within the company.

BUILDING THE PLATFORM

But installing networks is only part of the LAN unit's job. The single most important thing the LAN organization has done is build and support the LAN infrastructure, which Quinlan refers to as the "LAN Platform."

The platform describes approved equipment as well as how it is to be configured. "We're committed to Compaq, Novell and Lotus," Quinlan says. Off-spec technology may be kept in use if it's already in place, but all new gear must meet the platform requirements.

A typical LAN environment for a branch office features Novell NetWare 3.11 operating at 16M bit/sec and a Madge Networks, Inc. Smart 16/4 Ring Node local ring hub. The recommended network server is a Compaq ProSignia with 330M bytes of memory, smart uninterruptible power supply and a gigabyte or more of mirrored disk storage on Hewlett-Packard Co. equipment. HP is also the recommended vendor for printers, and 80386 or 80486 Compaq machines are put on the desktop. Because 14 branch offices have at least one Application System/400 running on site, many of the workstations are given AS/400 connectivity (see graphic, this page).


Standard LAN setup

SOURCE: JOHNSON & HIGGINS, NEW YORK
GRAPHIC BY ANNE GIANCOLA

The platform is a moving target, Quinlan says. It's constantly evolving to meet the challenges of new technologies. For instance, NetWare 4.0 is now running in the lab and should be distributed throughout the company next year. Windows NT will almost certainly have a place on the platform, as well.

The firm's effort is supported by the network itself. One of the on-line databases describes in detail the company's LAN platform, and another provides a list of approved vendors and equipment as well as the discounted prices for the gear.

In addition, this database includes photographs of products along with their descriptions. "We always try to have at least two suppliers," Quinlan says. "Branch offices are encouraged to shop for the best prices they can find."

Notes is very easy for the user, Wilson says, but it's rather complex for the network administrator. "We have positions open because not that many people are familiar with Notes," he says.

Quinlan says the situation is like how it used to be finding a Certified NetWare Engineer. "Several years ago, they were hard to find; today, it's almost a prerequisite for employment," he says.

Until the industry starts generating more Notes experts, Johnson & Higgins will continue to train new engineers itself, a process that can take as long as a year.

With the latest edition of Notes, the company will be able to handle much of the branches' network administration remotely from New York. But the server that functions as the hub for Notes is another story.

"It's the most complex part of the job because at the hubs, everything comes in – all E-mail, branch traffic, E-mail internal gateways and remote connections to clients. It's pretty critical," Quinlan says.

IN-HOUSE SALES

LAN installations keep Quinlan and his staff hopping. "We're more like third-party consultants than anything else," he says.

The LAN group gets its funding from branch offices, which act as sponsors. "If I can keep them happy, I can keep myself employed. But I can't force it down their throats," Quinlan says.

"We are sometimes viewed suspiciously when we arrive, and given the baggage we carry [in terms of previous encounters with home office technicians], it's not surprising. We walk in and meet the branch manager. When you say you are from New York their eyes glaze over. You have to sell the idea of a network to everyone who will be working on it," Quinlan says.

Wilson says, "Through 1993, we have been updating existing LANs and installing them in our larger offices. In 1994, we will do the smaller offices."

Johnson & Higgins has yet to come up with any figures showing productivity improvements based on the system, though a study is now under way, which is expected to show evidence of this progress.

Very simply, Wilson concludes, LANS and Notes have allowed Johnson & Higgins to change the way they do business.

"It's revolutionary, but it's obvious," Wilson says. "It's as though you were driving a car with square wheels and suddenly saw a car with round wheels. You see there is an incredible need that can be filled."

➡ Lazar is a free-lance writer based in the New York area.

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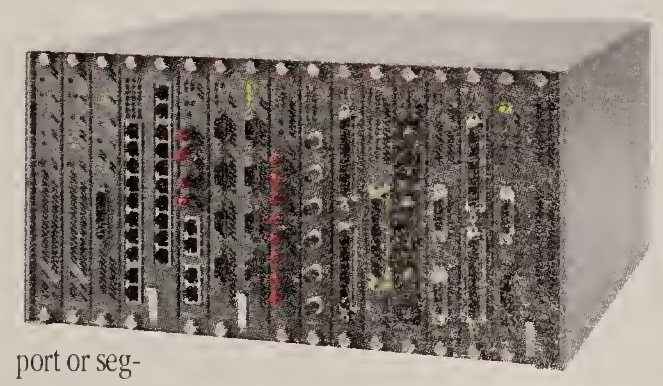

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NETWORK WORLD

RATE AND TARIFF MONITOR

by David Rohde

Have I got a deal for you

With as little as $40,000 per month total usage, you could be eligible for one of MCI Communications Corp.'s special deals now being revealed under a court order.

Called Special Customer Arrangements (SCA), these deals take ordinary tariffed services such as 800 service, T-1 leased lines, Virtual Network (Vnet) and the new Access Pricing Plan and provide huge discounts or specify lower rates.

But there's a catch. Like AT&T's controversial contract tariffs, MCI's SCAs are supposed to be available to any customer for 90 days after they take effect.

But MCI is taking the position that the 90 days counts from the date the customer signed the contract, not the effective date of the tariff filing.

Since these deals were secret until MCI was forced to make the filing, the 90 days is long over for most deals.

This situation also leads to anomolies such as when the tariff filing is effective Aug. 30 but the availability to others ends Sept. 22 (three weeks later) or even Aug. 31 (the very next day). AT&T protested this practice, but the Federal Communications Commission's Common Carrier Bureau denied the protest.

Be patient if you're interested.

Although MCI has filed more than 250 SCAs, there are lots more coming, and they're more likely to have real availability windows.

"[MCI] told me there are 400 to 500 of these," says Ellen Block, a Washington, D.C. attorney who negotiates special deals with all the major carriers. And you're free to negotiate your own SCA if you don't like the ones already revealed.

MCI's SCAs are particularly worth looking into as a counterweight against the rising rates of Vnet and competing virtual network services (*NW*, Sept. 6, page 26).

For example, one SCA states that all Vnet calls using a corporate card will be billed at a flat rate of 12.15 cents per minute during the daytime, 10.2 cents per minute during all other times, regardless of access and termination methods.

Another SCA option states that all on-net to off-net Vnet calls — perhaps the most common of all Vnet calls — will cost only 9.5 cents per minute if the customer meets certain usage requirements.

And for customers with more than $1 million per month usage, one option provides on-net to off-net calls at 7.93 cents per minute and on-net to on-net calls at only 5.66 cents per minute.

The special low rates — applicable starting with the first call — tend to be concentrated in the SCA options requiring well over $1 million of annual usage. Lower minimum plans tend to focus on volume discount schedules off the regular Vnet rates in MCI's Tariff FCC No. 1.

Meanwhile, some 373 AT&T contract tariffs are now available for inspection, leading to criticism that AT&T is steering larger corporate clients away from the more comprehensive Tariff 12 deals that provide consolidated billing and network management support. (Neither AT&T contract tariffs nor MCI SCAs provide this kind of integration; they just give different pricing terms than the carriers' regular tariffs.)

An AT&T spokesman said the new action is in contract deals because Tariff 12 is a limited market. "Most of those [prospective Tariff 12] customers have been approached and either they have it or they don't," he added.

Meanwhile, Sprint Corp. isn't disclosing any of its contract deals because no one has ordered it to do so yet.

But that will probably change soon, however, because Sprint is facing a similar court case to the one that forced MCI to open up its deals to public scrutiny.

↠ Rohde is associate publisher of the Center for Communications Management Information in Rockville, Md., a provider of rate and tariff information. He can be reached at (301) 816-8950, Ext. 292.

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BRIEFS

IBM last week announced a 75% pricecut and several enhancements for its ImagePlus/2 client/server imaging software. ImagePlus/2 now costs $2,890 for a single user; $4,470 for a five-user configuration; and $6,445 for a 10-user configuration.

Enhancements include a simplified user interface, easier installation, support for additional peripherals, automated backup and restore procedures, and the exchange of objects and folders between systems with different data models.

IBM: (800) 342-6672.

Lotus Development Corp. this week begins shipping a new version of its SmartSuite package of desktop Windows applications that contains the Approach database instead of cc:Mail software. The Approach database, which Lotus recently acquired, has been modified to include Lotus menu bars and icons.

The package costs $795. Upgrades to SmartSuite 2.1 cost $299 until the end of the year.

Lotus: (617) 577-8500

Powersoft Corp. last week announced pricing and availability of its suite of application development tools for developers and end users.

PowerBuilder 3.0, which is geared toward developers, costs $3,595.

PowerMaker, a simplified version of PowerBuilder 3.0 that can be used by end users with some programming knowledge, is priced at $349.

The PowerViewer query and report tool for end users costs $199.

All three of these Powersoft products will ship Sept. 20.

Powersoft: (617) 229-2200.

Traveling Software, Inc. last week announced CommWorks for Windows, an inexpensive suite of five Windows-based communications tools.

The software, which costs $199, provides facsimile services, file transfer, terminal emulation and access to remote files and printers via modem, serial or parallel cable, or infrared link.

CommWorks for Windows' remote access software operates in the background on any remote personal computer and allows users to access files and printers across most local-area networks.

Another component, LapLink Alert, notifies users when a file, message or fax arrives on their PC.

Traveling Software: (206) 483-8088.

The ASK Group North America last week announced that it has signed an agreement with **Wang Laboratories, Inc.** under which ASK will sell and support Wang's Open/image software in conjunction with ASK's application development and database software. ASK will market the Wang software under the name ASK Image.

Watermark building image in network applications market

Readying imaging server to supplement client software.

BY BOB BROWN

Burlington, Mass.

Watermark Software, Inc. has shaken up the imaging market since announcing a Windows-based product early this year, but the company's staying power will be determined by the Windows NT-based imaging server it has under development.

SKOK

The firm, which was formed by former Xionics President David Skok, has been gaining momentum ever since February when it introduced its $149 Watermark Discovery Edition software package.

Watermark Discovery Edition, which began shipping in May, relies on Microsoft Corp.'s Object Linking and Embedding (OLE) technology and a document scanner to add image objects to OLE-compliant applications, including electronic mail packages, spreadsheets and databases.

The software, for example, could enable a user to send an E-mail message containing a thumbnail-size image of a newspaper clipping that can be blown up into its own window by double-clicking on the object. The image objects are actually only pointers to the real image stored on the file server, ensuring applications are not slowed down.

The key to the company's strategy is to let users image-enable existing applications, said Skok, Watermark president and chief executive officer. Watermark has rejected the "image-centric" product strategy of other vendors that sell turnkey imaging systems with their own database and E-mail components.

The company has spent much of the summer forming marketing relationships with application vendors whose products can be integrated with Watermark's imaging software. Partners include Beyond, Inc., Reach Software Corp., SoftSolutions Technology Corp. and WordPerfect Corp. The company has also announced distribution agreements with Merisel, Inc. and others.

The introduction of Watermark Discovery Edition has prodded other vendors, such as Keyfile Corp. and Imagery Software, Inc., to speed desktop imaging products to market, analysts said.

"Not only did Watermark have a totally new concept that changed the whole dynamics of image enabling, but they set a price point that will have a tremendous impact on the market," said Bruce Silver, a vice president at BIS Strategic Decisions, a Norwell, Mass., consulting firm.

Jane Stanhope, director of image and

See Watermark, *page 65*

Watermark's growing circle of partners

Hardware vendors
- Ficus
- Fujitsu Computer Products of America, Inc.
- Nisca, Inc.

E-mail/work flow/ groupware vendors
- Beyond, Inc.
- JetForm Corp.
- Reach Software Corp.
- WordPerfect Corp.

Document management vendors
- SoftSolutions Technology Corp.

Development tool vendors
- Powersoft Corp.

Database vendors
- Borland International, Inc.

Application vendors
- To be announced

SOURCE: WATERMARK SOFTWARE, INC., BURLINGTON, MASS.
GRAPHIC BY ANNE GIANCOLA

Lotus executive sheds light on cc:Mail future

Q&A

It has been almost three years since Lotus Development Corp. acquired the fast-charging cc:Mail, the leading E-mail provider for local-area networks. While cc:Mail continues to outpace rivals Microsoft Corp. and WordPerfect Corp., it faces considerable challenges.

These include coping with the loss of many high-level employees, managing its explosive growth and guiding the integration of cc:Mail and Lotus' Notes (*NW*, Sept. 6, page 1). Next week, Lotus will address these issues and others when it meets with hundreds of cc:Mail customers at Interchange '93, the annual cc:Mail user conference in San Francisco.

To get a reading on the direction cc:Mail is heading, *Network World* Senior Editor Wayne Eckerson spoke with Larry Crume, a seasoned veteran appointed by Lotus last year to head the cc:Mail division.

What's your biggest concern going into Interchange '93?

The biggest concern I have centers around our tremendous rate of growth. We have been growing 80% to 90% in staff each year. We've added so many employees that we recently had to move into a larger office. In addition, we've been pushing out many new products and upgrades.

This year alone we've released new versions of cc:Mail for Windows and OS/2, the Lotus Organizer, a remote version for the Apple PowerBook, a new message router and several other things.

Some analysts claim that the pace of new development at cc:Mail is slowing down. Is this true?

No. However, we will not have all elements of the architectural upgrade ready this year as my predecessors had promised. That will disappoint customers.

The main problem is that we've been experiencing such rapid growth at the same time we've been trying to push through a major architectural upgrade. We've grown from 500,000 cc:Mail seats to 3.2 million seats in 2 1/2 years, and we expect to top five million seats

See Lotus, *page 65*

Repository technology comes to the fore

BY PETER LISKER

In the evolving world of database technology, repository technology is gaining momentum while at the same time creating confusion. As is often the case in high technology, it is hard to keep up with the latest jargon.

In essence, a repository is a special database that contains information pertinent to an enterprise. The term was first popularized by vendors of computer-aided software engineering (CASE) products to describe the databases containing the code for generating applications.

CASE tools typically use a modeling approach to lay out the programming needed to write applications that met an organization's needs. The repository, basically a database application with links to other databases, contain the information needed to generate the applications.

This information includes the databases that would be used by the application, pseudocode needed for generating the application code, and relational links to other databases and data items affected.

In a broad context, repositories are now being used

See Repository, *page 65*

IBM client/server work flow software debuts

Large Japanese customers embrace new products.

BY WAYNE ECKERSON

Manassas, Va.

Without much fanfare, IBM's Federal Systems Co. here has begun offering client/server-based work flow software that is being gobbled up by some of the world's largest corporations.

Released in June, IBM's Workflow Manager automates the process of defining and executing complex business processes, such as claims processing or loan origination. Workflow Manager currently runs on OS/2 2.0 clients and servers on one or more IBM LAN Server local-area networks.

Workflow Manager stores data, programs and work flow definitions in an OS/2 Database Manager database, which tracks the flow of work and automatically routes data and programs to the correct user at each step of the process.

This database-centric approach differs from some other work flow software, which uses electronic mail to route information between users or applications within a prescribed business process. However, Workflow Manager does support any E-mail program that is compatible with Lotus Development Corp.'s Vendor Independent Messaging (VIM) specification.

Workflow Manager was designed in conjunction with several IBM Federal Systems customers in Japan. The Sumitomo Bank, Ltd., one of the largest banks in the world, has already installed Workflow Manager to orchestrate the flow of applications across more than 350 LANs and 3,000 workstations.

The product is one of several IBM initiatives to crack the burgeoning market for work flow software. IBM Programming Systems, for example, is expected this week to unveil object-oriented work flow software, code-named Fidelio, which will initially run on OS/2 and later on AIX (*NW*, Aug. 23, page 1).

A source within IBM said that although Workflow Manager and Fidelio had separate origins, the teams developing the products have been working closely and exchanging technology and ideas. The two products will eventually be merged in a future release, the source said.

IBM's work flow initiatives

■ **Enterprise Process Management (IBM Imaging Solutions)** is a tool embedded within IBM's ImagePlus imaging software used to design and execute work flow processes.

■ **Fidelio (IBM Programming Systems)** is the code name for a soon-to-be announced client/server work flow product that runs on OS/2.

■ **Knowledge Integration Shell (IBM Industrial Sector Division)** is manufacturing work flow software developed by Universal Energy Systems, Inc. in Dayton, Ohio, that IBM resells.

■ **Process Weaver (IBM Europe)** is a work flow tool IBM recently acquired from Cap Gemini to support AIX development work.

■ **Workflow Manager (IBM Federal Systems)** is client/server work flow software that works across multiple LANs.

One of the major differences between the two IBM work flow products now is that Workflow Manager supports applications that run across multiple IBM LAN Server networks, whereas Fidelio runs on a single LAN. Workflow Manager uses the Advanced Program-to-Program Communications protocol to support server-to-server communications.

To maintain adequate performance in a multiple LAN environment, Workflow Manager sends data, program and work flow design information between servers across the network. In contrast, most other distributed work flow products store this information in a central database and use distributed database calls to retrieve it across the net. This latter approach bogs down performance when users deploy work flow software across a large number of LANs, according to Allan Moore, chief architect at IBM Federal Systems.

IBM is currently working on an AIX client/server version of Workflow Manager that would run on IBM RISC System/6000 Unix processors and store work flow information in IBM's Database/6000 Unix database. The AIX servers would support AIX, OS/2 or Windows clients running the Workflow Manager software.

Workflow Manager costs $12,000 per server and $250 per client.

©IBM Federal Systems: (703) 367-7181.

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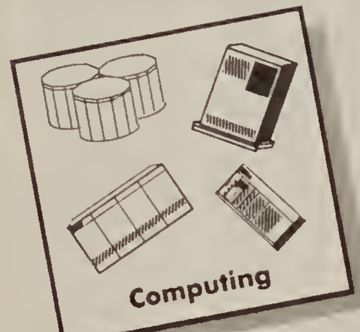

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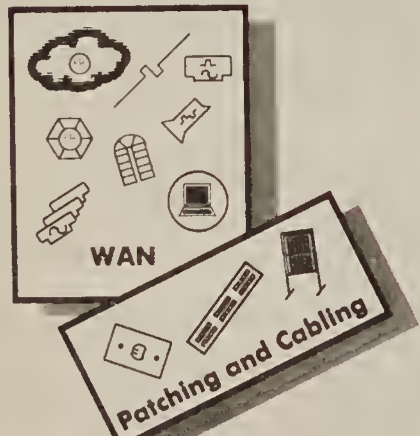

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Circle Reader Service #8

Watermark

Continued from page 63

work flow systems at International Data Corp., a Framingham, Mass., market research firm, said Watermark is trying to introduce imaging to a whole new user community.

"Watermark is really shifting the focus from the clerical worker — where image has its origins — to knowledge workers, who have periodic requirements to look at an image on a screen and share that image with different people in their work group," she said.

Watermark's strategy has been "to seed" the market with its desktop offering, Skok said. One user, for example, has installed Watermark's software at 3,000 desktops, while other users have installed the software at about a combined 1,800 seats, he said.

Although Watermark Discovery Edition looks impressive in demonstrations, some critics said the software will not withstand the rigors of daily use. One limitation is that the software is designed to store images as DOS files on existing net file servers, which are not equipped to support large numbers of images.

"Without an imaging server, Watermark can't really solve real business problems because it does not have the facilities to deal with large numbers of image objects," Silver said.

"I don't think personal imaging is going to make anybody a millionaire," IDC's Stanhcpe said.

Watermark's upcoming Windows NT-based imaging server could answer these criticisms. But not enough details have been released to determine how strong an offering it will be, analysts said.

Skok said Watermark's server-oriented products will enter beta testing by year end. The Watermark Imaging Server will work with a new version of Watermark's client software, dubbed Watermark Professional Edition.

Besides running on NT, the Imaging Server will include Microsoft's SQL Server database engine or another SQL database engine. The server will be designed to handle up to one million images initially and include the option of attaching an optical storage device.

"We have written the server software from scratch to be able to take full advantage of Windows NT features such as symmetrical multiprocessing, which will let customers scale up, and C2-level security," Skok said.

The server is expected to ship early next year.

©Watermark: (617) 229-2600.

Repository

Continued from page 63

to maintain two primary kinds of information.

The first type is the traditional application information. As an example of this, look at a system that tracks and controls a manufacturing process. Part numbers, inventory data and supplier information is often contained within a series of database tables.

At a higher level, application developers need to know this information without knowing the individual part numbers. A repository can contain this data, along with a functional and process model of how the data is used by the applications, thus speeding application development.

The other primary use of repositories today is for network management. Network managers might use a program that maintains a database of user workstation addresses and characteristics, data link structures and topologies, and telecommunications information. This information would again be contained within a repository that interacts with a database application, which provides critical data for effective net management.

The value of a repository environment is that it allows a multilevel approach to examining critical information. At a central MIS level, a repository can be used by management to examine the databases with which an application system interacts. By progressively stepping down through the levels of the repository, a high-level overview can become more detailed as each succeeding level of complexity is examined.

Using this approach, the repository fulfills a valuable function in providing a structure whereby developers can use the repository to store code or pseudocode (in CASE tools, for example), while allowing a consistent processing model of the enterprise requirements to be developed.

Repositories today combine relational and object-oriented technologies. The objects in the repository are, in fact, database applications used to develop, control and maintain application systems. For example, CASE vendor tools frequently use a graphical approach to showing a model of an enterprise's processing requirements. Storing this model as an image in a database limits the usability of the model since the object is a single entity.

By combining this information with a relational model that contains data about each process in the model, users can examine, modify and work with the individual components that really represent data processing elements.

Early versions of repositories were usually proprietary. This meant that a specific CASE vendor's tool could add, modify or work with objects in its repository. This led to use of multiple CASE tools.

Today's open environments demand something different. The approach most vendors are taking is to provide a repository scheme with application program interfaces so users can mix and match tools and applications from multiple vendors as needed.

In the future, we will likely see repositories nested within one another. This will allow users to create complex client/server applications, which use the latest development tools while still providing a high degree of interoperability between disparate systems. ◻

Lotus

Continued from page 63

by year end.

Some parts of the upgrade — such as Version 2.0 of the automatic directory exchange — will come out this year, but most will come out next year. This includes things like user-defined administrative fields and hierarchical folders and directories.

In February 1992, Lotus laid out a multistep strategy for integrating Notes and cc:Mail, culminating in the creation of a single back-end mail engine. Where do you stand on this?

The real question is what are the best ways to bring Notes and cc:Mail together. This year, we've provided the Lotus message exchange facility that allows users to exchange messages between Notes and cc:Mail message stores.

We've shipped the automatic directory exchange, and we've given Notes 3.0 users the option of using cc:Mail while working within Notes.

We will continue to seek ways to deliver significant value-added capability to customers around messaging and distributed document management.

Many cc:Mail users have been alarmed by the notion that you may scrap or modify the cc:Mail engine to integrate it with Notes. How have you responded to them?

> **"I will say categorically that we are committed to evolving the current cc:Mail product and its file-sharing architecture."**

There is a lot of emotion surrounding the integration of Notes and cc:Mail.

I will say categorically that we are committed to evolving the current cc:Mail product and its file-sharing architecture. We will not back away from that.

With 3.2 million customers, it would be ludicrous for us to back away from it. However, we must absolutely continue to evolve it.

The key is to bring the two products together in a way that users can get enhanced value from both without sacrificing the strengths each has to offer.

However, customers are asking us to bring [Notes and cc:Mail] together. Most of our Notes customers are also cc:Mail customers, and they want closer integration between the two products to reduce administrative overhead, among other things. However, the question of how we will bring them together is not completely finished yet.

Are you going to reveal any more of your integration strategy at Interchange?

No comment.

> **"The key is to bring cc:Mail and Notes together in a way that users can get enhanced value."**

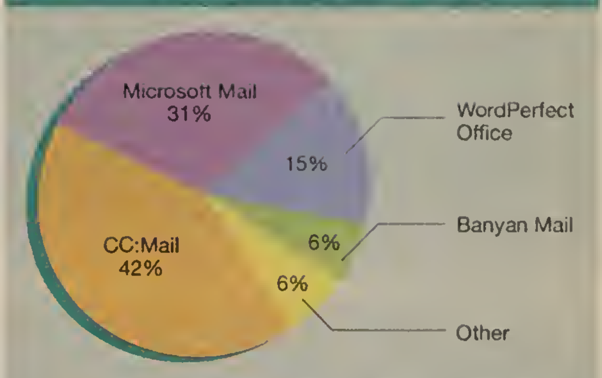
Why the rash of departures of former cc:Mail employees?

I'm sure each case is unique. Part of it is natural turnover. Part is that most of the people began working for a small, start-up and would rather be part of that culture than a bigger company.

And again, we are experiencing rapid growth, and that has put tremendous pressure on everyone. Things have not been easy.

Are the departures linked in any way to differences in opinion about the future direction of cc:Mail?

LAN E-mail market share



Lotus Development Corp.'s cc:Mail dominates the market for LAN-based E-mail products.

GRAPHIC BY TERRI MITCHELL SOURCE: DATAQUEST, INC., SAN JOSE, CALIF.

There are always differences of opinion. I doubt that is why people have left.

How are you coping with the loss of many key people in development, sales and marketing?

We have a good set of people in place with strong knowledge about the company and the company's technology. CC:Mail celebrated its 10th anniversary in August. We're not lacking for experience. We've also been able to hire some experienced people off the street. ◻

Help desk

Continued from page 2

dom-access memory. Any suggestions?

Dave Phillips, Rochester, N.Y.

Ronald Nutter, escalation manager of 900 Support, a 24-hour, seven-day-a-week Novell technical support company in Lake Oswego, Ore., replies:

The problem appears to be caused by the terminate-and-stay-resident (TSR) programs not capturing a snapshot of memory just before they load, so that when they unload, the RAM environment is not restored to its original state.

There is a solution to your problem. Look on CompuServe in the IBMHW or NOVUSER forums for a set of programs called Mark and Release. The network form of this program set is MARKNET and RELNET 2.9 by TurboPower Software. MARKNET will record the machine environment before you load a TSR, and RELNET will restore the environment after the TSR has been unloaded.

My company recently purchased a Hewlett-Packard Co. LaserJet 4Si MX printer, which comes with a JetDirect card for high performance. However, the print throughput speed is suffering because we cannot connect the printer directly to our Digital Equipment Corp. Ultrix network running Transmission Control Protocol/Internet Protocol and DEC's Local Area Transport (LAT). Can you recommend a solution?

Randy Cona, Rochester, N.Y.

David Lorenz, technical support coordinator of HP's network printer division, responds:

Currently, DEC LAT is not supported on the JetDirect card. However, there are companies that have worked closely with HP to design Modular I/O (MIO) cards — high-speed interface cards that allow direct network connectivity. XCD, Inc.'s XJet Print Server and Emulex Corp. Network Systems Division's NetJet Print Server provide MIO cards that support the LaserJet 4Si connected to a DEC LAT system.

For product information, call XCD at (714) 476-7855 and Emulex at (800) 368-5393. Either of these solutions will allow you to connect your printer directly to the network to improve printer performance.

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The LAN-based shows concentrate on technical "interoperability" issues. Important issues, to be sure, but not the big picture.

ComNet is the only global networking show. It's the conference and exposition focused on the enterprise internetwork. It not only covers LANs but also the latest technologies like ATM, Frame Relay, SMDS, FDDI, and mobile data communications that are shaping the new enterprise.

ComNet also deals with real-world solutions like imaging, voice, data, workgroup and database applications that are driving networking technology.

Produced by IDG World Expo.

Furthermore, ComNet is produced and managed by IDG World Expo, the worldwide leader in professional conferences and expositions for the information technology industry ... including ComNet Prague, EuroComNet and ComNet Korea. It is part of International Data Group (IDG), the leading global provider of information services on information technology.

ComNet is officially sponsored by *Network World* and *Computerworld.* IDG World Expo also brings the full support of other IDG publications and companies including *Federal Computer Week, InfoWorld, CIO,* and International Data Corp. in providing exhibitors with the highest quality attendee promotion.

If your company is global, or thinking of going global, then ComNet '94 ought to be in your tradeshow plans. It makes good sense, since 45% of the people who went to ComNet last year already have multinational networks.

ComNet is a show for decision makers.

3Com's John Covert said, "What we're seeing are the principal network people who are really on the firing line, or the people who have to make the decisions for next-generation technology."

Jim Warner, marketing director for the Network Management Forum and frequent ComNet participant said, "At ComNet the quality of attendee is very high. The collective purchasing power of ComNet's enterprise network management audience is unsurpassed."

According to the latest independent audience surveys of ComNet and Interop, 47% of ComNet attendees are from companies that spent $1 million or more on networking equipment in 1992, vs. 36% for Interop Fall.

First show of the year.

Traditionally, ComNet is the launching pad for new networking products. At ComNet '93, half of the 450 exhibitors introduced 288 new products.

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Editorial

"More than anything else, the award gave us confidence that we were on the right track and strengthened our resolve to keep working for open systems." Raymond Pardo, Bechtel Group, Inc.

"The award contributed to our credibility and allowed us to get projects approved by top management far more easily." William Spies, First National Bank of Maryland

"The award had a big, positive impact on my career. I wouldn't be doing what I'm doing now without the recognition that began with winning it." Larry Ehlers, Bendix/King

Wonder what award these network executives are talking about?

It's *Network World's* User Excellence Award, what we like to think of as the Academy Awards for the user community.

For nine years now, we've been honoring network visionaries — those from organizations as diverse as Ford Motor Co. (1992) and Unified School District 259 of Wichita, Kan. (1987). The mission statements of the award winners couldn't be more different, but their ability to apply network technology to achieve their goals unites them.

Winning the User Excellence Award brings a good deal of visibility to your company as a leader in the application of information technology. And it can help you personally and professionally, as the comments above attest.

Past winners and honorable mentions have told us that winning the award was a big boost for their network departments and improved their standing with upper management. For some, the award has even brought career advancement. But winning takes work. You have to tell us what makes your network special — and that doesn't mean just having the biggest network or using the latest technology.

The time is now. We'll be accepting entries for the Ninth Annual User Excellence Awards only until Sept. 27. To enter, send us a 250- to 500-word abstract outlining how networking has helped your organization achieve its strategic goals.

Send the information to our special projects editor at 161 Worcester Road, Framingham, Ma. 01701 or fax it to (508) 820-3467. And good luck.

→ JOHN GALLANT

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MACROSCOPE

By James Kobielus

PDAs are nothing without communications

The first personal digital assistants (PDA) are a bit of a disappointment after all the press and marketing buildup. Communications functions were supposed to be integral to Apple Computer, Inc.'s Message Pad, the first implementation of its Newton hardware. It was also supposed to be integral to the Tandy Corp./Casio, Inc. Zoomer, AT&T/EO, Inc. EO Personal Communicator and others.

But communications functions now seem more an afterthought in the product designs. None of these products' core functions — personal organizer, address book, notebook and datebook — inherently requires a communications link.

The original PDA vision, according to Apple Chairman John Sculley, was a low-cost, all-purpose, hand-held, graphically oriented, stylus-driven, untethered communications terminal. Today's PDAs certainly fit this description — indeed, their communications interfaces run the gamut from the familiar RS-232C cable and software combination that feeds a modem, to more exotic creatures such as facsimile modems, cellular modems and wireless local-area network transceivers. However, something still seems to be missing.

What will distinguish these compact devices from the standard palmtop organizer or pen-based computer? Handwriting recognition and gestural data input are important PDA features, but they won't make a splash in the public consciousness.

To make fledgling PDAs really useful, what's needed are compelling mass-market applications and a ubiquitous, wireless, public-networking infrastructure geared to hand-held data terminals. Both of these objectives are within users' reach if the communications industry rallies around a coherent, application-oriented vision.

My crystal ball says the defining application of PDAs will be in electronic news, document and message distribution. PDAs will become digital paper — a portable medium for capturing, filtering, displaying, storing and relaying perishable information, such as urgent messages from the office, up-to-the-minute stock prices or breaking news.

PDAs will be communications-enabled information receptacles and will not be regarded as productivity tools any more than we would regard our newspaper or cable television as a productivity tool. And, unlike desktop and laptop personal computers, they will seldom be used for heavy-duty data entry, analysis, composition or storage.

The communications industry won't realize this digital paper vision unless it reengineers PDAs and the public network along the following lines:

First, PDA users should be provided with affordable, flat-rate, ubiquitous, wireless access to real-time news and information services. Today's real-time news services are prohibitively expensive and accessible primarily through dial-up terrestrial phone lines. A mass market for PDA-enabled electronic newspapers will not develop until wireless users can access a basic package of real-time newsfeeds at an affordable, flat monthly rate. This pricing structure has served the CATV industry and consumer-oriented information services providers via such services as that of Prodigy Services Co. quite well.

Then, every PDA should be equipped with electronic mail client software or firmware and a ready-to-go account on a wireless messaging service. It's not enough to simply provide PDAs with physical communications interfaces, such as infrared ports and wireless modems.

Users should be able to start communicating the moment they take their PDA gadgets out of the box. It doesn't really matter which wireless messaging service the PDA is set up to use — whether it be services offered by ARDIS Co. RAM Mobile Data, Inc. or any other vendors' that will spring up with the advent of personal communications networks. Any of these fledgling services will almost certainly intercommunicate through X.400 and X.500 gateways. Let's hope that reports of Apple planning to enable its Message Pad to communicate with AT&T's EasyLink messaging service prove true.

On top of access to a wireless service, each PDA should also support real-time geolocation, the capability to determine where a user is geographically located at all times. This would require the combination of a global positioning system (GPS) receiver and a CDROM-based map database. The main concern of mobile users may not be news gathering or messaging so much as simply figuring out where they are on a map.

PDAs would be the ideal medium to bring such geolocation to the masses. The devices could be equipped with low-cost GPS receivers that, by homing in on satellite signals, would calculate the user's precise latitude and longitude to within 10 feet. The PDA could pinpoint these coordinates on street maps retrieved from a miniaturized CDROM installed in a Personal Computer Memory Card International Association slot on the PDA.

PDAs should also be engineered to display digital paper that closely resembles actual text documents and newspapers. However, the Message Pad and other PDAs are just too small and too low in quality to serve as effective publishing mediums. The minimum acceptable screen dimensions should be the same as a standard-size letter — 8 1/2 by 11 inches — with VGA-quality resolution and color. To display text and graphics in their original document formats, PDAs should also be equipped with cross-platform file viewers such as Adobe Systems, Inc.'s Acrobat or No Hands Software, Inc.'s Common Ground, perhaps burned into the PDA's read-only memory.

I'll bet there are vendors working on all these communications-savvy PDA ideas. It would be nice, though, if someone in the industry presented a PDA vision with a little more thought behind it than just "Smaller is better."

Ubiquitous communications is the promise of PDAs. It should be this focus on communications that drives the research and development surrounding this potentially revolutionary technology.

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NEW TECHNOLOGY

By James Carlini

Time to stop kicking the tires and buy

It can be difficult to measure whether your acquisition and implementation of new technology is advancing your organization fast enough. It is especially difficult if you only compare your company to other organizations within the domestic market.

A more accurate measurement would be to compare your company to other organizations within your industry globally. Closing a deal to buy and implement new technology might be much more important to your organization if you knew how fast other companies around the world were buying and implementing new technologies and gaining strategic advantage.

Earlier this year, I attended the Telecom Asia '93 trade show in Singapore. There were about 300 exhibitors that spent a ton of money trying to get a piece of the Pacific Rim market. One of the big differences I noticed between this trade show and recent U.S. shows, however, was that the users were genuinely interested in the products and real business was being conducted. People there were buying and making decisions.

That has not been the case for the majority of U.S. users, which have been sitting on the fence for the last two to three years.

Managers in Singapore, Malaysia, Hong Kong and other Pacific Rim countries recognize the benefits of adding new technologies to gain competitive advantage. They don't just talk about it or attend seminars — they do it. They make the decision to acquire products, and they follow through on implementing new networks with them.

It's about time American managers wake up and smell the coffee. Major upgrades and new technologies have been implemented at a snail's pace in the last few years at most Fortune 500 companies. Why? Low budgets. No budgets. No strategy. No leadership. Pick an excuse, cover your rear. That has been the lame strategy many managers and executives have used to avoid being layed off, prolong mediocre careers or just wait until the economy picks up.

Stop making excuses and buy. Start taking a stand, and push for new capabilities. If you won't because you are afraid of losing your job, then quit. If you don't start to accelerate technology applications within your organization, you won't have to quit — all of you will be laid off because your companies won't be able to compete anymore. This includes chief executive officers.

At the Telecom Asia trade show, users were looking at everything from videoconferencing to satellites to local-area networks to private branch exchanges. They weren't just kicking the tires — they were buying. Reengineering is a reality to them, not the latest slogan out of a bookstore rack.

While dining out in Hong Kong with a client, I noticed signs saying "No Portable Phones" displayed throughout the restaurant. So many people were using portable phones during lunch to conduct business that the ringing distracted other diners from their business conversations.

It would be nice to see technology here in the U.S. become so prevalent that someone would have to put up a sign saying, "Enough already!"

In Hong Kong, I spoke with someone from the North American ISDN Users' Forum who was there on business. He said part of the problem with some of the senior user management is that their egos are inversely proportional to their action plan for reengineering and applying new technologies. These leaders are doing little compared to their counterparts in Asia. They are more interested in talking a good game than playing one.

Ladies and gentlemen, cost-cutting days are over. If your company's senior management thinks that it will be able to compete in the 1990s by putting in generic equipment, switching long-distance carriers or some other cost-reduction gimmick, they are out of touch with reality.

Profits are going to come from spending money on technology and applying it correctly to expand and create new markets — not by saving a penny here and there.

It's too bad we can't set up a contest for user management a la the one in the movie *Glengarry Glen Ross*. First prize for implementing new technologies could be a Cadillac El Dorado, second prize a set of steak knives and third a pass to the unemployment line. Based on sales and usage of new technologies and network services in the U.S., a few of you, and some CEOs, might rate the steak knives, but the vast majority would be fired.

Carlini is president of Carlini & Associates, Inc., a strategic information technologies consulting firm in Hinsdale, Ill., and also lectures on information technologies at Northwestern University in Evanston, Ill. He can be reached at (708) 986-1888.

Letters

Temper fear with reason

In discussing hacker attempts to crack direct-inward system access (DISA) ports on private branch exchanges (Aug. 16, page 32), Michael O'Connell describes the use of a "war dialer" capable of accessing as many as 20 lines at once. His indication that a four-digit password could be broken in 28 minutes is believable if we assume that the system allows a large number of attempts before hanging up, doesn't "waste" the hacker's time by responding to each invalid attempt with a message, and other such criteria.

His indication that the same brute-force approach could crack an eight-digit password in less than six hours, however, leaves me questioning how this was calculated. The hacker's "problem" is not his hardware or software, but the fundamental requirements of the phone system. I did the following calculations (rounding in some cases):

- ■ Eight-digit passwords = 100 million possible passwords
- ■ Six hours = 21,600 seconds

In cases like this, it is usually assumed that the hacker will, on average, have to try half the possible passwords before getting a correct one. So the hacker will need to try about 50 million passwords in this case. This works out to about 2,315 attempts per second for the six-hour period. Assuming the hacker can spread these attempts over 20 lines, 116 attempts per second per line would be needed.

Since each password consists of eight digits, the dialer must send eight dual-tone multifrequency (DTMF) tones for each attempt. At 116 attempts per second for any one of the 20 lines, this would require the transmission and recognition of about 928 DTMF tones per second per line. According to the book *Understanding Telephone Electronics*, DTMF tones must last a minimum of 50 msec and there must be a 50-msec interdigit interval. Therefore, it takes about 100 msec (one-tenth of a second) for each tone.

This means the hacker can only send 10 DTMF tones per second per line. At this rate, the hacker can only try about 27,000 eight-digit combinations per line in six hours (540,000 for all 20 lines). Unless the hacker is very lucky, the system won't yield to this approach for over three weeks of 24-hour-per-day attempts.

This, of course, assumes that the hacker has almost unlimited access to 20 lines into the PBX and does not encounter even minimum security such as the PBX hanging up after a specified number of failed attempts and transmitting a response to an invalid password.

I am also puzzled by Mr. O'Connell's assertion that "common passwords, such as area codes and birth dates" constitute "15% of all possible alphanumeric combinations."

"Alphanumeric combination" implies (at the minimum) the use of 26 letters of the English alphabet and 10 digits, 0 through 9. "All possible alphanumeric combinations" would be 36! (factorial). This is the formula to use to calculate the number of possible passwords: — 3.72 X 10 to the 41st power. Fifteen percent of that would be lower but still a large number.

With only a few thousand birthdays possible in a 100-year span, a few hundred possible area codes and far fewer than a million English words in even a very comprehensive dictionary, we're not even close to 15% of "all possible alphanumeric combinations."

Mr. O'Connell's comments are no doubt well intentioned, and PBX users are well advised to choose their passwords and other system protection features wisely. There is no question that PBXs are under attack and that successful break-ins have collectively cost companies millions of dollars.

PBX users should also, however, be advised that the dangers are sometimes exaggerated (or miscalculated). Spending that is motivated by the infamous FUD (fear, uncertainty and doubt) factor is unlikely to be money well spent.

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Circle Reader Service #27

DON'T abandon your filing cabinets just yet...

BY MARK LANGNER

While vendors appear on the verge of making network strides with document management, most products lack interoperability and sufficient net links.

There's a radical shift taking place in the market for document management applications, and users stand to emerge as the primary beneficiaries. Led by the likes of Apple Computer, Inc., Microsoft Corp. and Novell, Inc., vendors are evolving their products to offer a diverse range of document management services at the operating system and even network operating system (NOS) level.

What this means for users is that document management can now be offered as a set of services available to applications across the network. Further, with document management capabilities built into operating system products, users can begin to achieve the level of interoperability they've desired for years.

Until now, document management has been viewed on an application-by-application basis — meaning users tailored dedicated local-area networks or subnets to accommodate a single document management package that often served a particular business need, such as invoicing or order entry.

Make no mistake, while vendors are plowing ahead with efforts to broaden document management services across enterprise networks, the road they blaze is sometimes booby-trapped with landmines that can set users back.

Users such as The Boeing Co. and Dell Computer Co. have hit many document management snags head-on but have managed to overcome the lack of cohesion among products and other hindrances to solve particular business problems.

"There is no one silver bullet for all the things a company wants to do with document management," says Priscilla Emery, vice president and director of intelligent document services for New Science Associates, Inc., a Westport, Conn., consultancy.

Document management has grown up as an add-on to existing applications aimed at specific markets, such as computer-aided design and manufacturing or publishing, according to Donna Kmetz, product manager of document management for Interleaf Corp. of Waltham, Mass. "Today, individual document management tools are moving toward becoming general in nature," Kmetz says. "However, the reality is that they are still oriented to the original market for which they were developed."

The problem users face today is that while there may be a document management package that fits very well for one application — such as forms processing — that product may not readily adapt to other document management needs, such as text search and retrieval. The result is that network managers can end up with a number of different document management systems across the network, and few today adhere to emerging standards to adequately promote interoperability.

"Our employees should be able to get any information to answer a customer question — regardless of the question — from their desktop," says Eugene Friedman, vice president of applied technologies for The Chase Manhattan Bank, N.A. in New York. But, Friedman says, Chase has 16 imaging systems, and no more than four are the same brand, an indication of the narrow focus many products have in addressing document management needs.

A number of different capabilities can be rolled under the document management umbrella, including imaging, work flow, forms processing, compound document control, text indexing and retrieval, document version control and document archiving. Most document management solutions combine some of these functions to address a particular document management need.

The document processing segment of the electronic imaging market is growing annually by 72% and will exceed $2.9 billion by 1996.

Interestingly, no single tool fills the bill as a fully integrated package. Overall, the market is quite fragmented from a product standpoint, as companies with strengths in certain portions of the document management market, such as imaging, struggle to integrate various capabilities with other portions, such as text storage and retrieval.

Part of the reason document man-

Continued on page 72

Continued from page 71

agement products are so fragmented is they are often built to perform functions that are relevant only to part of a document's life cycle. Document management products, for instance, may be designed strictly for document creation, revision and distribution, or even archival and retrieval.

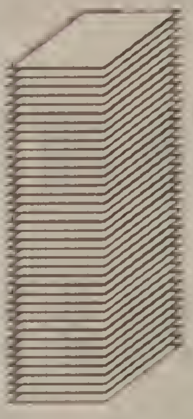
DELL'S DILEMMA

Many business problems regarding documents are related to an organization's dependence on paper documents. If the goal is to reduce the flow of paper in a company, it does little good to recreate a document management problem in electronic format by bringing the concept of paper into the document management system.

"To solve our document management problem, the first key was to get away from thinking of the document as a piece of paper, or an image of a piece of paper," says Tim Deagan, manager of service tool development for Dell Computer Corp., a major manufacturer of microcomputers. One issue Dell tackled was how to give several hundred customer service representatives on-line access to a number of technical manuals so they could look up information on the fly to answer customer questions.

The initial idea was to scan each document and then use optical character recognition (OCR) and indexing to relate the images of the manuals' pages and diagrams to an information database. Dell, however, later decided such an approach was ineffective from both a systems and an end-user standpoint. "For customer reps who were used to 'thumbing around' for specific information in a manual, the on-line imaging system would be too slow," Deagan says. Additionally, the systems required to support such imaging capability across 200 to 300 users would be too expensive to justify the investment, not to mention the effort needed to scan in the data and index each manual.

Dell ultimately implemented a system, using Interleaf's WorldView on-line publishing system, which took text and graphics in their native file format and allowed them to be displayed to the user as a formatted document. This approach required much less storage space and transport bandwidth than a scanned image.



92 billion original paper documents and 300-400 copies of those originals are produced each year. In the U.S., the average business document is copied 19 times during its life.

Dell realized that in order to bring the manuals on-line, the information it needed probably already existed as text files on the network. Ultimately, it decided that scanning the manuals would effectively mean taking snapshots of every page, which essentially consumed about 50K to 60K bytes per image. By turning instead to existing text files stored across the net, Dell was able to marry the data file with illustrations scanned into the net and save 30K to 40K bytes per image file.

The Interleaf solution also enabled Dell to couple full-text search capabilities with this display capability that allows the user to find needed information quickly.

As illustrated by the Dell example, users face a number of systems issues with the distribution and release of documents as well. Images require large amounts of bandwidth to be moved through a LAN efficiently, as well as the time and effort of putting documents through the OCR process should the document need to be searched or altered. Additionally, the indexing of that document can be a huge task requiring additional manpower — even with OCR someone has to tell the computer what information is important and what isn't. Dell rejected using images for exactly these reasons.

MATURING TECHNOLOGY

Today's document management solutions are attempting to address this issue of multiple requirements in an end-user organization. The industry stands at a crossroads in its development.

On one side of the road are traditional document management products such as Interleaf's Relational Document Manager or WorldView products, FileNet Corp.'s Workflo, or Deerfield Systems, Inc.'s DVision. These are generally very powerful tools which have been developed to address specific applications needs — such as invoicing or other forms-related activities — and usually have a very narrow appeal. The information that these products create, and the systems that these products are designed to work on, do not always lend themselves well to being shared throughout the enterprise network.

Providers are working to improve interoperability, either through standards or through embracing a concept such as Apple's Object Linking and Embedding (OLE) for document format. But at this point in time, interoperability is limited. OLE allows users to borrow components from several documents to form a new file, yet maintains a link back to the original to automatically reflect changes made to the borrowed object.

On the other side of the road are desktop and NOS vendors such as Microsoft, Apple and Novell, which have seen document management develop as its own application and are attempting to integrate document management capabilities into the base functionality of their NOSes. These tools, though more accessible and standardized across the network, provide for emerging document management servers. Subsequently, their ability to support complex applications is generally weak.

These two trends seem to be converging. Stand-alone document management software and systems providers are attempting to make their products more networkable, allowing for the interchange of documents between document management applications and other applications, and NOS providers are working to bring more power to their document management capabilities.

"There is a move toward connectivity between stand-alone document management applications over the network," says Michael Bragen, software industry analyst with Business Management Consulting, Inc. of Lexington, Mass. "Vendors are working to provide integration of products on an enterprise basis." This integration will come from both sides of the document management industry, as high-end stand-alone applications are bridged by the underlying capabilities of network and desktop operating systems.

Someplace in between these two camps lies Lotus Development Corp.'s Notes, which combines tasks such as electronic mail and groupware with document management capabilities like work flow and imaging. Lotus Notes 3.0 provides a de facto operating system within which document management can be supported.

Notes allows users to develop extended strings of macro commands, which can be used to pull up documents or even establish a work flow for them.

> **"There's a move toward connectivity between stand-alone document management applications over the network," says Michael Bragen of Business Management Consulting.**

Notes 3.0 enables multiple client types to maintain and synchronize documents within the Lotus Notes document database. Users can create detailed macro command strings to automate how documents are handled and by whom across the network. Users can then access documents and open them using Lotus applications such as the Lotus Notes Editor, or through using other applications which support OLE to access the information in that document.

At first glance, it might seem Notes is the best compromise in this confused market — providing cross network and cross platform support for documents, combined with a centralized approach for managing them. However, document management only works if it fits the needs of users very closely.

"Network managers need to identify the application which needs to be addressed, and then choose document management tools to solve the application rather than try to fit the application into a document management tool," Dell's Deagan says.

Ending the nightmare with standards

With such diversity among available document management products, integration of these offerings across a corporate LAN is often viewed as a nightmarish project.

The problem is magnified when a company attempts to extend document services to customers and suppliers.

"At an enterprise level, there is a mix of different ways to deal with a document," says Bruce Silver, vice president at BIS Strategic Decisions. "Standards would help to integrate these things."

Overall, the document management industry is moving toward standards to help ensure product integration, which eases the exchange of documents. Since various documents, such as an image or a word processing text file, have vastly different formats, there are multiple standards developing for different types of documents.

For images, Tagged Image File Format (TIFF) has established itself as a de facto standard for images. TIFF was developed by Aldus Corp. for the interchange of bit-mapped images and is widely used by imaging products. TIFF provides a common format for the storage of bit-mapped images. TIFFs appeal is its wide acceptance among different software applications programs. Most programs that create images can read or export TIFF images.

For compound, formatted documents, Standardized General Markup Language (SGML) is gaining acceptance. SGML provides a standardized structure to mark up a document — for example, to assign attributes to text and define the structure of the text on the document. Once marked up, the information about that document is stored in a standardized manner so that the document can be reformatted by any application that reads SGML — even applications different from the one that created the document. Vendors such as Aldus, Interleaf Corp., Microsoft Corp., Novell, Inc., WordPerfect Corp. and others have or are planning products that support SGML.

Other standards also exist, such as Open Document Architecture (ODA) and Microsoft's Object Linking and Embedding (OLE). Although OLE is not a formal standard, it provides a standardized format for compound document elements. The Joint Photographic Expert Group (JPEG) standard provides a standardized way to compress large images that may be used by a document management system.

The accompanyin graphic lists the different standards and indicates to what extent users are embracing them.

BY MARK LANGNER

User support for document standards

Has your organization committed to any of the following standards?

Standard	Percent responding yes	Percent responding no	Percent evaluating
Acrobat	0	94	6
AFP	19	81	0
CALS	19	75	6
JPEG	25	54	21
ODA	19	50	31
OLE	32	55	13
SGML	32	30	38
TIFF	50	50	0

AFP = Advanced Function Printing
CALS = Computer-Aided Acquisition and Logistics Support
JPEG = Joint Photographic Experts Group
ODA = Office Document Architecture
OLE = Object Linking and Embedding
SGML = Standard Generalized Markup Language
TIFF = Tagged Image File Format

Based on interviews with 20 users.

SOURCE: NEW SCIENCE ASSOCIATES, INC., WESTPORT, CONN.
GRAPHIC BY TERRI MITCHELL

INTEGRATING THE APPLICATION

Document management systems and software providers are working to allow for interoperability of their products — either through standards, mergers or partnerships. However, true integration of products to allow for seamless use across the network is a ways off.

Norman Eddy, senior manager for systems development at Boeing Support Services, a division of The Boeing Co. in Seattle, says, "The shrink-wrap approach to document management is somewhat of a fallacy, especially for large applications where it is more of a customized process."

For customers, many of whom are trying to provide an integrated solution for their user community, this integration must either be provided in-house or through a systems integrator.

"At this point in time, in a large organization, there are too many types of systems to expect document management providers to be able to provide this integration," says Business Management Consulting's Bragen. "Customers will have to look to systems integrators or do this themselves."

This is exactly what Vermont National Bank Corp. of Brattleboro, Vt., is in the process of doing to speed its mortgage and consumer loan application process.

In the past, with a mortgage application, the 100 to 150 separate pieces of paper necessary for the evaluation of an application were placed in a manila folder and routed through the loan approval process. Underwriters would reference the folder as the loan went through the approval process, and loan processors would enter customer data into a Wang Laboratories, Inc. minicomputer system that was used to process the application. Vermont National Bank wanted to integrate the two processes, so the loan application and the necessary reference documents could be combined into one electronic file. This would allow for quicker turnaround of loans, as well as allow Vermont National to consolidate the tasks of underwriters and loan processors.

But the bank could not find a system to combine the forms processing for the loan application with the image retrieval and reference system that would run on a personal computer. "Everybody has their own piece of the market," says Diarmuid McLoughlin, vice president of Information Systems Management at the bank, "But nobody has come up with something to fill the total need."

Vermont National's solution was to turn to IBM, which was able to integrate imaging software systems from Image Business Systems, Inc. (IBS) of New York with forms processing software from Lakewood Corp. of Greenfield, N.H.

IBM provided the system hardware and coordinated the cooperation of IBS and Lakewood to create a single application for Vermont National, which runs on a PC and has forms-processing and image retrieval capabilities for this application. Now, as users pull up a loan application, the form appears on one side of the screen, pertinent document images attached to that application appear on the other. The user has access to all of the necessary background information in image format and can enter that data directly into the application form displayed on the other side of the screen.

The NOS will provide document management services that can be used by any application on the net, instead of a dedicated document management application.

NET DEMANDS

Depending on the application, document management systems can burden users with new demands for equipment and even increased network bandwidth. To a great degree, the installation of the LAN lets the environment allow document management to occur. In many cases, a current LAN installation will support the network load created by a document management system.

However, for some applications, especially image-intensive ones, evaluation of how that information will be delivered to end users is absolutely necessary. In some cases, the application is large enough or specialized enough to allow for its own technology to support it.

Boeing Support Services has implemented an image-intensive system to support the distribution of engineering documents around its Seattle-area locations. There are nearly 5,000 changes made to Boeing's engineering documents each week, and the process of document creation is a 24-day flow-through process.

By 1995, 50% of all office information will be in digital form.

With the previous system, once the documents were created, they were microfiched and placed on so-called "aperture cards," which were then copied and sent to 70 repositories around the Boeing facilities. There were literally millions of these cards, and it required a staff of 180 just to file and retrieve cards for the persons needing information. Additionally, workers who needed to review a document would have to walk to the repository, sometimes as far as a mile away at Boeing's huge complexes.

Boeing wanted to move the documents closer to the users, as well as reduce the amount of time it took to retrieve the documents and the amount of administrative overhead needed to support distribution of these documents.

To replace this process, Boeing implemented a customized solution. The company decided to create image files of the various engineering drawings and distribute them via on-line terminals. Users would get changes to the documents faster, because they no longer had to wait for files to be placed on an aperture card. Moreover, because all of the documents would be stored on a centralized server, there was no longer a concern about not having the latest copy of the diagram.

Since work began on the project in 1985, Boeing was forced to create its own solution. Boeing turned to I/A Corp., an Alameda, Calif., systems integrator, to design software that would distribute the images. Boeing then replaced the 70 repositories with 200 Sun Microsystems, Inc. workstations linked to a Fiber Distributed Data Interface backbone running at 100M bit/sec and handling 125,000 transactions a day (see graphic, this page). Three million engineering documents are stored on 25 towers of optical disks with a total storage capacity of 1 terabyte of data.

Users can now access documents in a matter of seconds, and the process of taking an engineering document from its completion with the engineers until it is available on the system has been cut from days to hours.

The cost of implementing this system has been offset by the cost-savings of replacing the old process. "We have a 45% return on investment, with payback in three years," Eddy says.

Still, except for the most cost-saving of applications, implementing a stand-alone network to support the application may not be possible despite the need for image or other expensive technology to support a solution. This is where NOS providers begin to fit in.

"In most cases, you wouldn't want to spend a quarter of a million dollars for an optical jukebox just to support a single application," says Bruce Silver, vice president at BIS Strategic Decisions, a Norwell, Mass., market research firm.

Silver sees the NOS providers moving toward integrating document management capabilities into LANs. "Eventually, filing a document in an optical jukebox will be like printing. It will lower the costs of placing these devices in the network by bringing a standard interface to managing items such as images," Silver says. By creating document management servers, placing document management equipment such as optical jukeboxes on the LAN instead of in a stand-alone system, the cost of that equipment can be recouped by multiple applications.

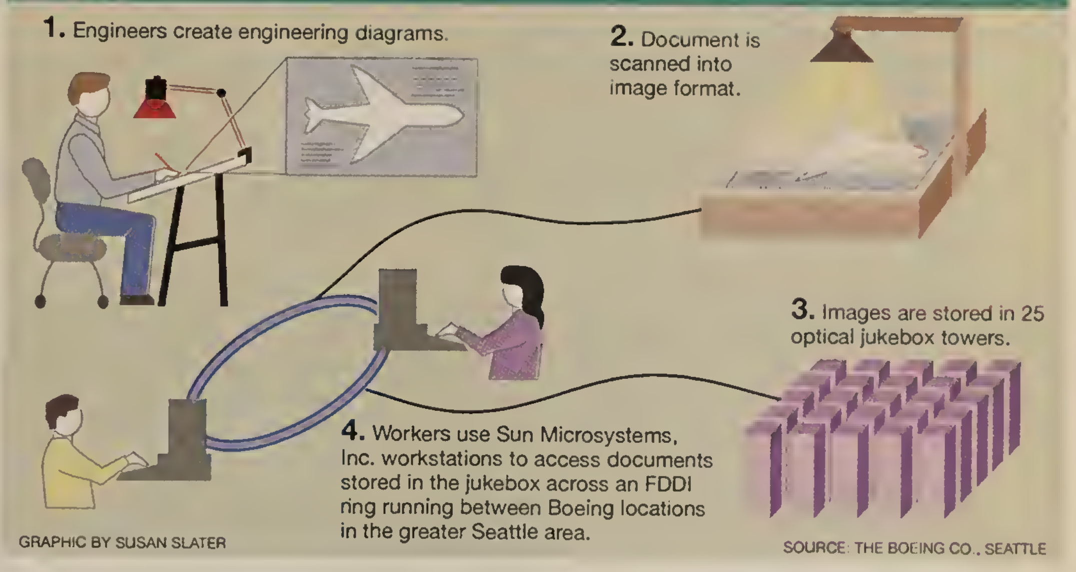
As document management tools move away from industry-specific applications toward more generic implementations, NOS providers are developing hooks into their products on which document management systems can ride. The upshot is that the NOS will provide document management services that can be used by any application on the net, instead of having a dedicated document management application.

Already, Apple System 7's Publish and Subscribe, Microsoft's Dynamic Data Exchange and OLE, and Novell's Image-enabled NetWare are indications of how document management is evolving.

Novell has pursued this concept of document management services for the network using a group of optional NetWare Loadable Modules (NLM), called Image Document Management Services (IDMS). These NLMs provide NetWare with an extended, application-independent architecture to support doc-

Continued on page 74

Boeing's document process


1. Engineers create engineering diagrams.
2. Document is scanned into image format.
3. Images are stored in 25 optical jukebox towers.
4. Workers use Sun Microsystems, Inc. workstations to access documents stored in the jukebox across an FDDI ring running between Boeing locations in the greater Seattle area.

GRAPHIC BY SUSAN SLATER

SOURCE: THE BOEING CO., SEATTLE

Expanding your document vocabulary

Document management encompasses a great deal of different capabilities. Document management solutions use these capabilities to a differing degree for filling user document management application needs. These capabilities include:

- **Document archiving. Provides an organized and electronic method for storing and retrieving documents within an organization.**
- **Compound Document Control. Allows users to control a document that may consist of as many as several different elements, such as a spreadsheet, a graphic and text. As changes are made to the original element, in its original program, those changes flow through to the final document.**
- **Document Version Control. Allows users to track the status documents that a number of users may alter to ensure that necessary updates are not made to older versions of the document or that older versions of the document can be retrieved for historical reasons.**
- **Imaging. Allows nonelectronic documents, such as paper forms, to be integrated onto the computer processing platform. These can be merely an unalterable snapshot of a document for review or archival purposes. They can be read into data format using optical character recognition (OCR) technology to allow for processing by the computer system or alteration by users.**
- **Text Indexing and Retrieval. Allows information contained in a document to be read and indexed. This enables end users to find and access information across a local-area network that pertains to a particular subject, regardless of the document type.**
- **Work flow. Pertains to the specific control of documents as they are used by an organization. Work flow can be used to control the routing of documents to specific persons or groups, as well as the pace at which documents move through the organization to ensure that they are processed within certain time guidelines.**

BY MARK LANGNER

Continued from page 73

ument management services on the LAN. Users can access the document management capabilities as a service of the LAN rather than as a part of a specific application. Novell has worked closely with Imagery Corp., a Bedford, Mass., spin-off of Eastman Kodak Co., which is developing the document management services for NetWare.

There are four different services planned for IDMS. Novell has already delivered the High Capacity Storage System (HCSS) as part of its NetWare 4.0 offering. HCSS is a NetWare service that links document management storage devices, such as optical jukeboxes and traditional media, to the NetWare file system. Novell plans to offer three other application services that can be layered on top of HCSS. Mass Storage Service (MSS) provides a method to monitor and manage usage of files on the network. It allows net managers to migrate occasionally used files from server memory to near-line or off-line storage devices, as well as decide the most appropriate location for different forms of data.

For instance, a directory may be kept on a hard disk, but the images contained in the directory are stored on a faster optical jukebox.

Document Management Service (DMS) will provide a filing cabinet view of the network file system for easier access to files, while Image Management Service (IMS) will provide facilities to create and manage image files as network files, including the ability to print, fax, store or E-mail images on the network. So far, Novell has been mum on when it plans to deliver MSS, DMS and IMS.

Currently, the document management strengths in the operating system lie in the creation and control of compound documents. Documents with various elements or objects are created, and the operating system tracks the various pieces of the elements to ensure that changes to one element are flowed through the document.

NOS and desktop operating systems can also be used as parts of other document management solutions. Vendors such as Hewlett-Packard Co. and Lotus have integrated OLE into products to provide compound object management. Apple has created AppleSearch, a text search and retrieval capability, which utilizes Apple's XTND format for documents in Macintosh formats.

Operating system vendors are also trying to deal with the tough issue of reconciling documents across various platforms. OLE works in Windows and Macintosh environments and is planned for Unix and OS/2, and Apple provides a host of translators for AppleSearch to allow it to handle documents from other platforms.

KEY LIES IN OBJECTS

Operating system vendors and NOS providers are reaching out to influence how documents are manipulated across a user's network. However, it is unlikely either group of vendors will dominate the document management scene.

> **Operating system vendors are also trying to deal with the tough issue of reconciling documents across various platforms.**

"Over the next five years, it seems that document management will continue be solved on an application-by-application approach," predicts Dell's Deagan.

The question remains: To what degree will customers be able to integrate these different applications on the LAN. The key may lie in object control approaches such as OLE. While the individual application may be implemented to support work processes, if the documents that are created can be stored in formats that conform to OLE or XTND, these documents will be able to be stored and accessed by a whole mass of users who have yet to discover the wonders of document management.

➜ Langner is an associate at TeleChoice, Inc., a Verona, N.J., consultancy specializing in voice and data services. He may be reached at (201) 239-0700.

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Novell

Continued from page 14

for token-ring and Ethernet networks. NetWare Connect works in conjunction with Digiboard Corp. and other multiport communications hardware, while RLN is sold with DCA's communications adapters.

RLN will have a nice feature for Windows users included in its next version, scheduled to ship in October. Users will be able to disconnect from networks from within Windows. NetWare Connect cannot do this since its client is a DOS application; Windows users must exit Windows before disconnecting from their office networks.

NetWare Connect will complement Novell's long-standing remote control product, NetWare Access Server, which the firm will continue to sell. NetWare Access Server combines Quarterdeck Corp.'s DesqView and software from Symantec into a single PC that supports multiple remote control users.

To use the two Novell products in tandem, network administrators would move modems from the Access Server machine to the NetWare Connect machine, which Novell officials claim will improve reliability.

OUTBOUND-READY

The second series of features included in NetWare Connect supports dial-out access from the network using a pool of modems. This means companies can leverage their investment in modems across their entire network of users, rather than have a modem at every desk.

Novell's Asynchronous Communications Server software that supports this function has been available for some time. To connect to a networked modem required each network user to load a special driver and to use software that worked in conjunction with this driver.

Many asynchronous communications products, such as Hayes Microcomputer Products, Inc.'s Smartcom and DCA's CrossTalk, provide such support. However, Novell's ACS product was not very reliable, and it will be phased out and replaced by NetWare Connect. The same ACS drivers can be used with NetWare Connect, however.

What is noteworthy about NetWare Connect is that the same modems can now be shared for both dial-in and dial-out or dedicated to each task. Network administrators can choose the appropriate scenario when the product is installed. In addition, as many as 32 modems can be connected to a single server. This presents unparalleled scalability and flexibility for network administrators.

There are several products that offer a portion of the features found in NetWare Connect. The closest match can be found in products announced but not yet shipping from DCA and Motorola UDS as well as in Shiva's diverse product line.

Last month, Motorola announced its BitRUNR line of communications servers that offer both dial-in and dial-out features. However, these products will not be available until year end. The high-end product in the BitRUNR line supports as many as 26 modems attached to a single server that can be split between dial-in and dial-out users.

> **With all its functionality, NetWare Connect is a confusing product to install and test.**

DCA's RLN doesn't include support for dial-out access, although the company plans to release this support next year. And RLN only supports up to 16 modems from a single server.

Shiva's NetModem/E has long had the ability to provide dial-in and dial-out access, albeit for a single modem that is provided as part of the product by Shiva. A separate Shiva product, called LanRover/E, provides the ability to pool up to eight modems on a single server.

NetWare Connect takes the best from both Shiva products. It allows modems to be pooled, sharing the expense of a single PC acting as a server, and supports a variety of modems.

DIVERSE CLIENT SUPPORT

The third leg in the NetWare Connect product is the ability to support both Macintosh and PC clients for the dial-in portion.

Macintosh clients use Apple's Appletalk Remote Access (ARA) software, so no additional client software is required. This is the first time Novell has supported ARA clients.

Previously, NetWare Access Server supported Macintosh clients on a dial-in basis using a special version of PC/Anywhere licensed by Novell.

However, this software created a DOS character-mode session for the dial-in Macintosh and did not allow Macintosh software to access the office network.

Shiva has a confusing product line, with each product providing part of the picture.

The NetModem/E supports both Macintosh and PC dial-in clients but uses its own client software, which is not compatible with ARA. LanRover/L — a different version of the product than the NetWare LanRover/E — does support ARA clients but not NetWare.

Centrum Communications, Inc. this month will ship a software upgrade for its communications server that offers ARA support, and Motorola promises ARA support in its BitRUNR line, as well. In addition, Telebit Corp. has announced support for ARA in its NetBlazer products.

A LOT TO KNOW

With all this functionality, NetWare Connect is a confusing product to install, configure and test.

The skill set required is enormous: Network administrators need to know mo- dems, understand the subtleties of remote node and remote control products, be familiar with configuring multiple protocol clients and NetWare server-based NLMs, and understand how Apple's ARA software supports Macintosh clients on a dial-in basis. That's a lot.

And there are products that may be a better choice, especially when it comes to supporting non-NetWare networks or LAN-to-LAN dial-up routing connections. These include the existing products from DCA and Centrum.

In addition, a new product from Stampede Technologies, Inc. called Remote Office offers a combination of remote control and remote node technologies.

Novell's NetWare Connect is exclusively for NetWare clients and servers, although it does provide for support of Internet Protocol protocols. Centrum's offering, RLN and Remote Office will support LAN Manager and VINES networks via the Network Driver Interface Specification protocols, while Remote Office offers native LANtastic support, as well.

NetWare Connect 1.0 will ship in October. Novell has three licensing options: a two-port license for $595; an eight-port license for $2,195; and a 32-port license for $5,995.

➻ Strom is a free-lance writer and president of his own consulting firm in Port Washington, N.Y. He can be reached via the Internet at 3193660@mcimail.com.

Senior Editor Caryn Gillooly contributed to this story.

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Tues. - Wed., 10 AM - 5 PM
Thurs., 10 AM - 4 PM

SEMINARS
Mon., 10 AM – 4 PM
Tues., 11:30 AM - 6 PM
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REGISTRATION HOURS
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4 ☐ Office Products Dealer
5 ☐ Service Vendor
6 ☐ Software Developer
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9 ☐ Value Adder (VAR/VAD)
10 ☐ Distributor
11 ☐ Other (Specify)____________

Corporate Volume Buyers

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B ☐ Advertising
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YOUR JOB FUNCTION

(Check one only):

AA ☐ Corporate/Financial Management/Owner/Principal
BB ☐ MIS/Data Processing Management
CC ☐ Designer/Manager of Enterprise – Wide Data Networks
DD ☐ Data/Telecommunications Management
EE ☐ Telecommunications/Network Planners
FF ☐ Network Manager
GG ☐ LAN Manager
HH ☐ Network Systems Analyst
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PP ☐ Software Developer
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PP ☐ Software Developer
QQ ☐ Sales/Marketing
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VV ☐ Consultant
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189	190	191	192	193	194	195	196	197	198
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CONNECTIVITY

Mainframes and UNIX®

3270 Users can access UNIX Applications as a VT100.

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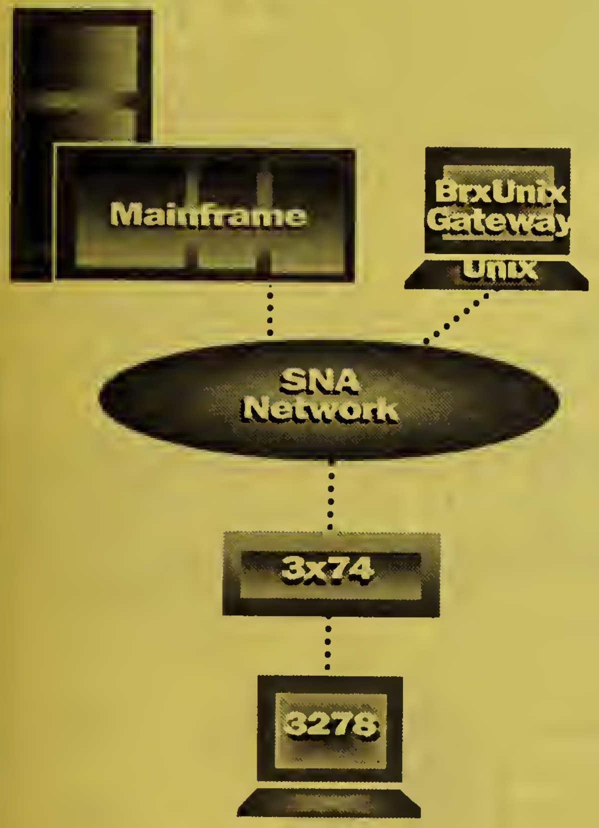

BrxUNIXGateway Benefits:

No software on Mainframe.

Dynamic VT100/3270 mapping.

Protection of Investment:
- Use existing 3270 terminals to access UNIX applications
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Affordable Open Systems:
- Use of Open UNIX systems for communication software
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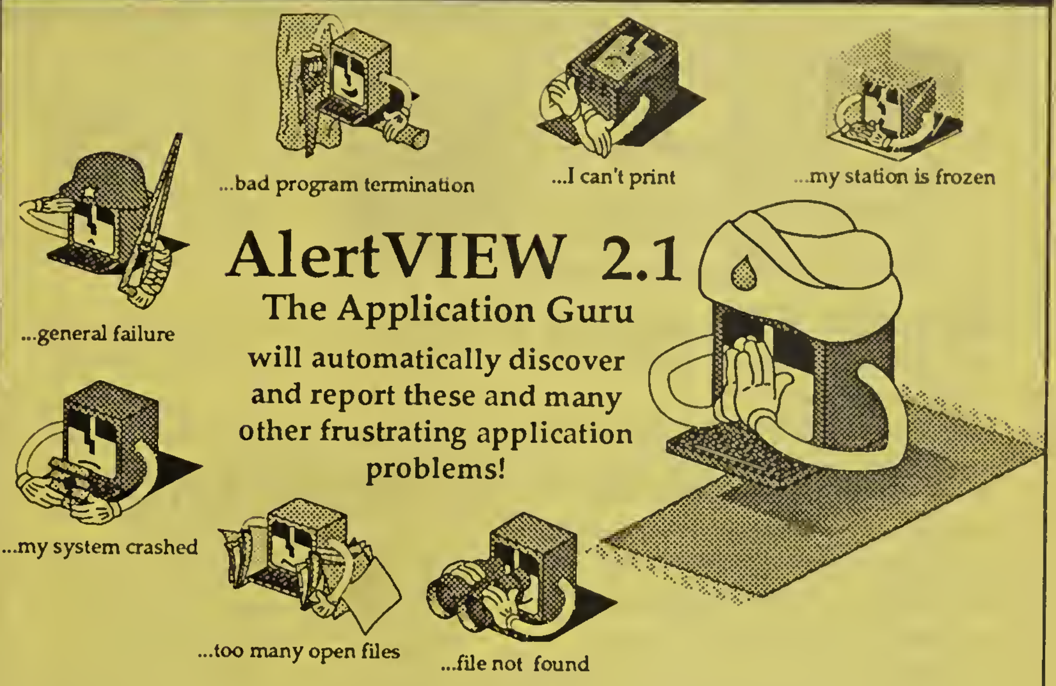

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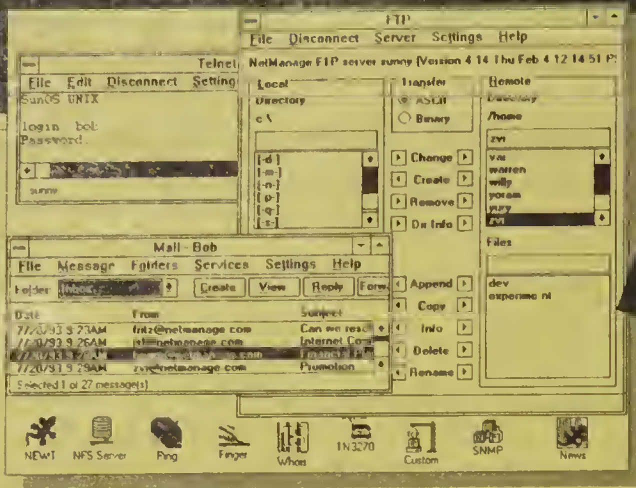

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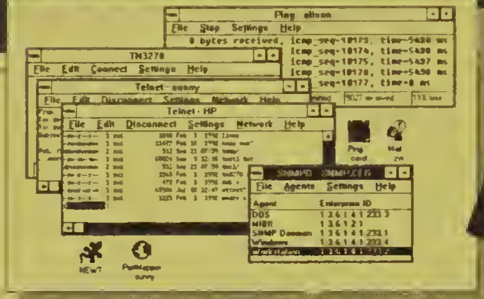

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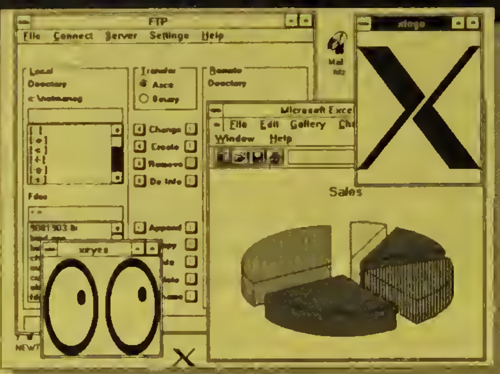

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X and TCP/IP
Optimized Pair

Highlights:

- Takes only 10 minutes to install both X and TCP/IP
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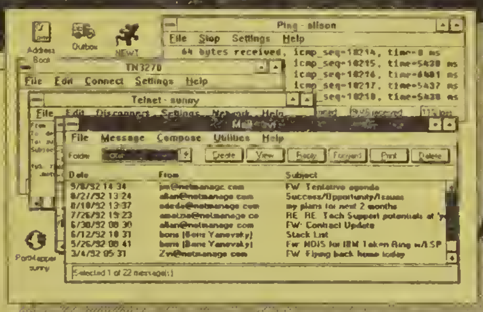

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- Direct access to SMTP/Unix mail from Windows
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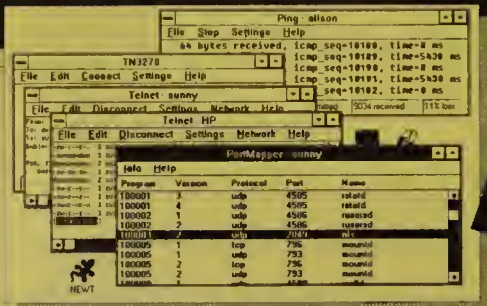

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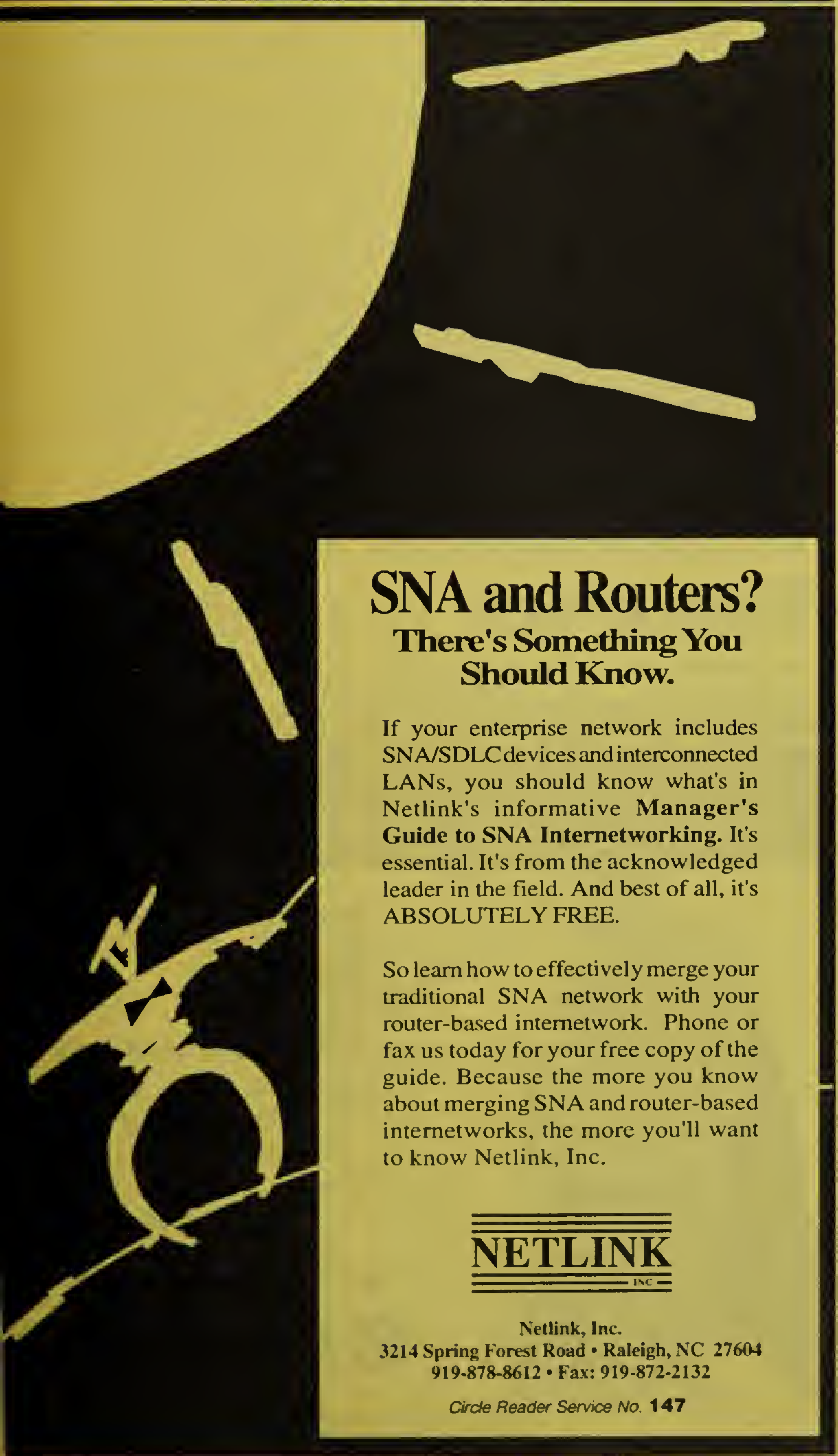

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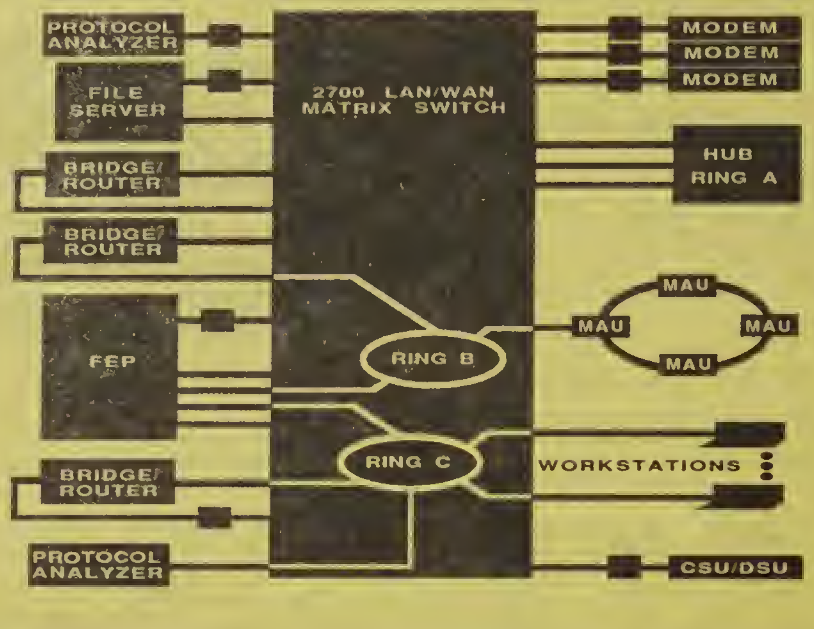

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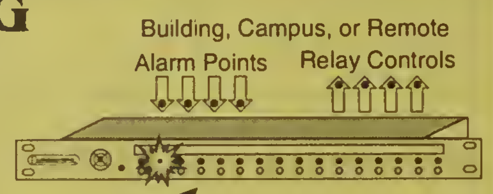

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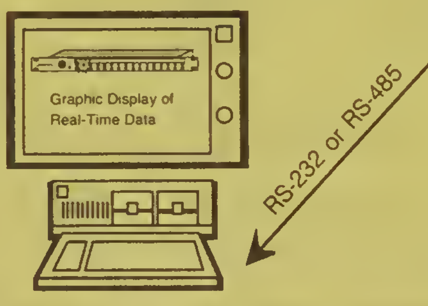
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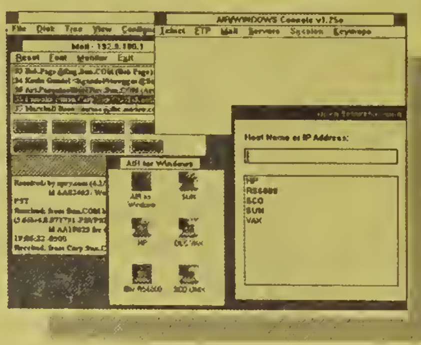
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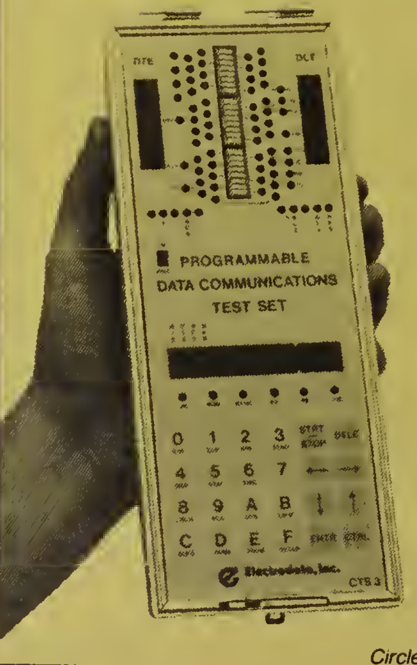

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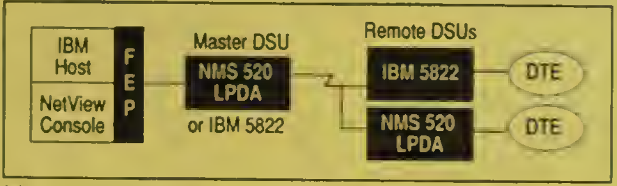

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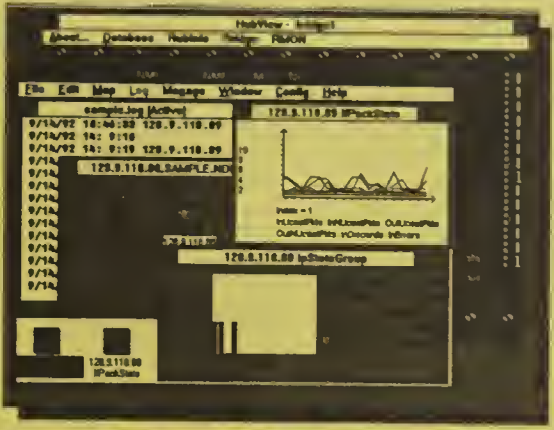

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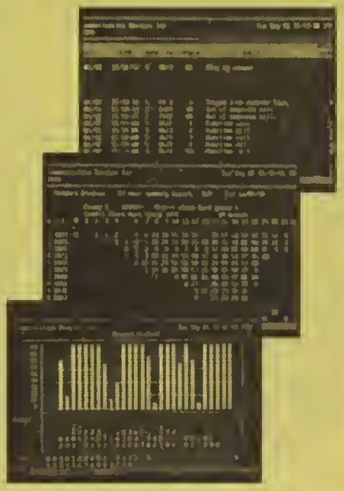

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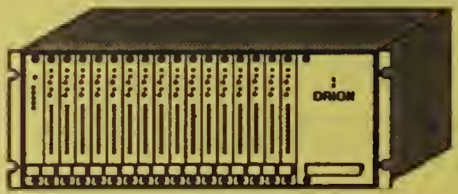

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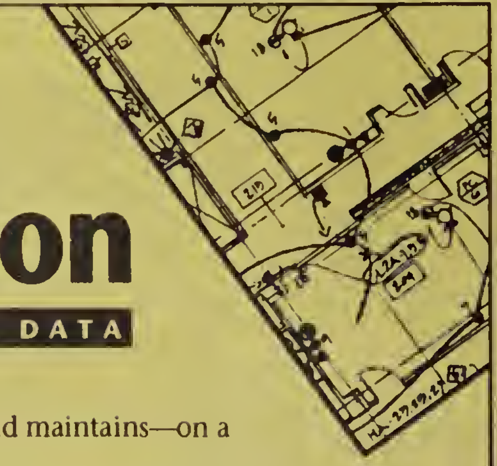

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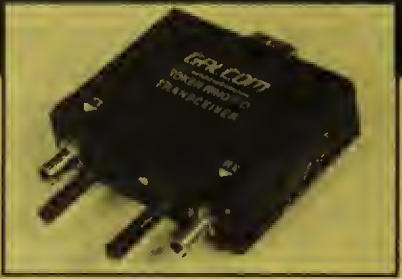

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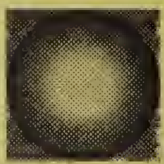

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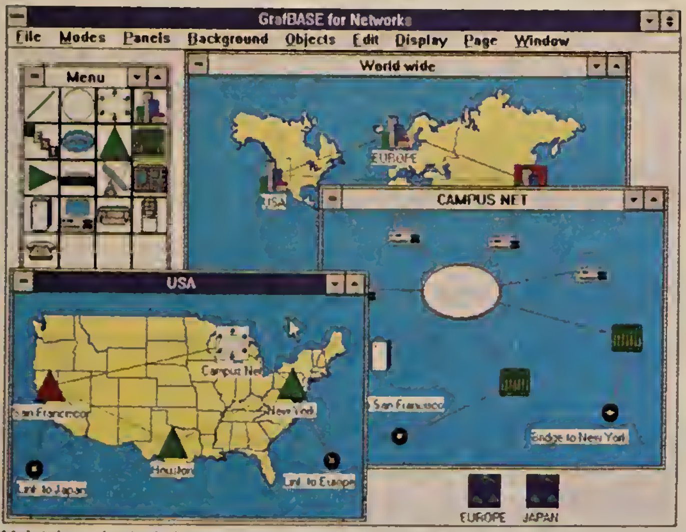

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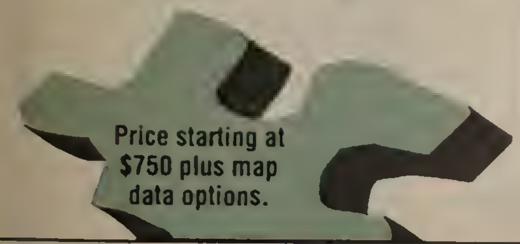

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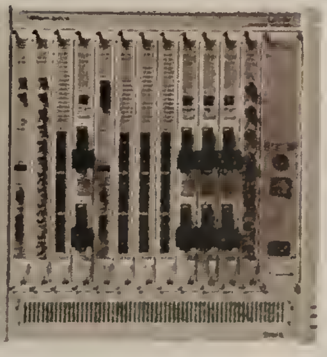

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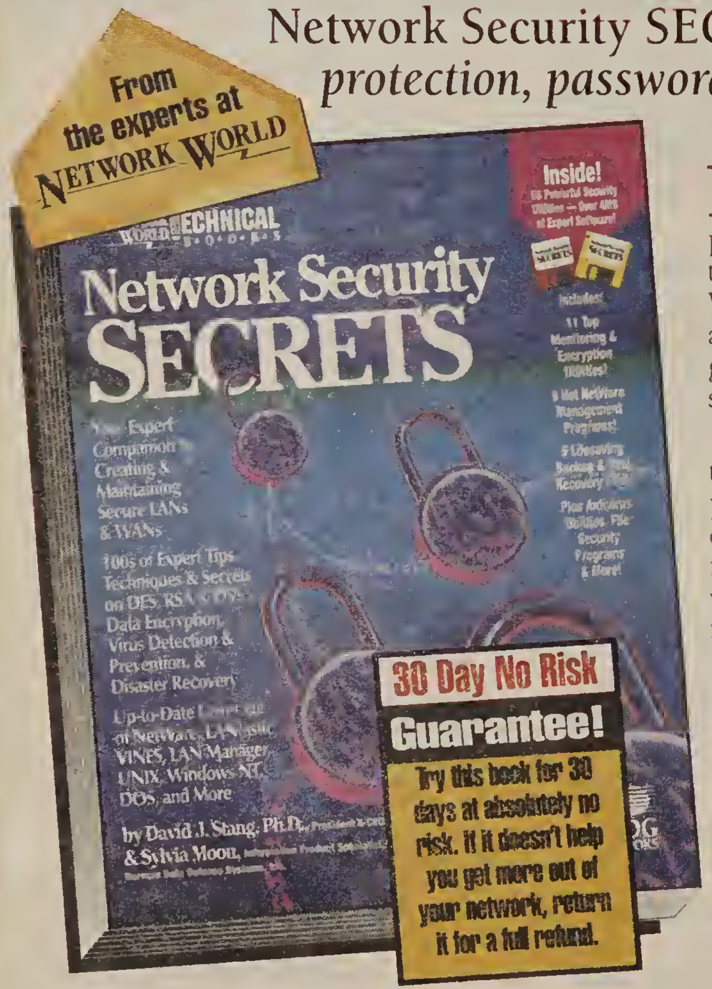
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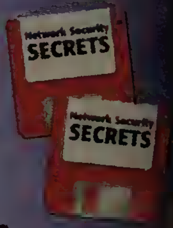

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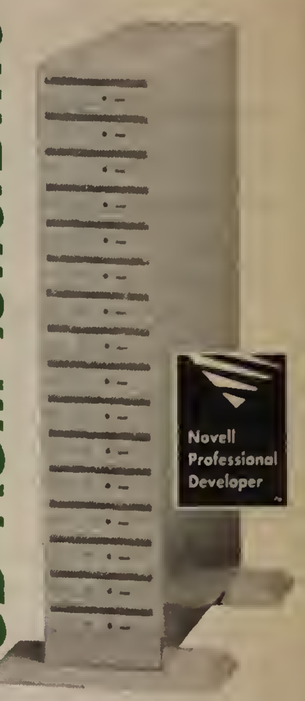

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Microsoft's recruitment advertisement in the Supplement in this issue Page S22

Accunet

Continued from page 1

an attractive price," said Hemant Vaidya, product-line manager for Accunet high-speed digital services at AT&T.

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SOURCE: AT&T, BASKING RIDGE, N.J

T32 pricing will be based on a per-mile fee and a monthly charge, rather than priced according to mileage bands. Users will also pay AT&T to have their traffic multiplexed up to a 32M bit/sec link.

Vaidya claimed T32, which supports 21 T-1s, could offer bigger savings than other services.

For example, a user with 10 T-1s between Atlanta and Cleveland pays $45,872 a month. With T32, the user would pay $35,893, saving $9,979 and getting 11 spare T-1s through the bargain. That same company would save $6,661 by using a T32 link in place of a T-3, which supports 28 T-1s. (see graphic, this page).

AT&T and WilTel are the only long-haul carriers that offer fractional T-3service. Sprint Corp. said it will roll out fractional T-3 sometime next year but would not elaborate, while MCI Communications Corp. claims it is evaluating demand for fractional T-3.

AT&T's proposed Accunet T32 pricing*

Route	Miles	10 T-1s	T32 (21 T-1s)	T45 (28 T-1s)
Atlanta to Cleveland	52	$45,872	$35,893	$42,544
Addison, Texas, to Akron, Ohio	1,004	$62,650	$55,000	$63,800
Dallas to Philadelphia	1,297	$72,692	$65,305	$77,559

*When T32 is bought on a monthly basis

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: AT&T, BASKING RIDGE, N.J.

Steve Sazegari, a principal analyst with Ryan, Hankin and Kent, Inc., a consulting and research firm in San Francisco, said there is solid demand for T32. "AT&T is responding to pressure from their large customers who can't afford T-3. The pricing is a little high, but that could change," he said.

As many as 800 users have from nine to 15 T-1s and may move to T32, according to Tom Nolle, president of CIMI Corp., a research and consulting firm in Voorhees, N.J., that tracks advanced services. "Our research also indicates that there are 250 to 350 underused T-3s that could be moved to T32."

Len Evenchik, director of communications for the Commonwealth of Massachusetts, predicted T32 will be a hit with current T-3 users.

"T-3 is so expensive that I think a lower speed and more economical service like T32 will be appealing to large users," Evenchik said. "The pricing sounds attractive."

VAIDYA

AT&T will begin controlled introduction of T32 next week and offer general availability in December. Users can access the service with multiple T-1s, lower speed fractional T-3 links or with T-3 lines.

But users and analysts have complained about the high cost and limited availability of T-3 local access. "Access is just too expensive for many customers," said Sazegari. "If T-3 access was less expensive, T32 would likely be more widely used."

Using multiple T-1s requires the user of inverse multiplexers to logically pool the circuits. AT&T said T32 installation intervals will range from 20 to 45 business days.

AT&T will allow users to combine T32 usage with usage from fractional T-1, T-1, T-3, Dataphone Digital Service and lower speed fractional T-3 for maximum discounts under its Multi-Service Volume Pricing Plan. The carrier will offer T32 on a monthly basis or under one- to five-year term plans.

Vaidya said a company that signs up for a minimum usage of $1 million a month and the five-year term plan – the longest term contract – will receive a 57% discount.

The carrier plans to bring T32 under its Service Assurance Warranty, which can get a user a refund of some service costs if it experiences certain service problems. AT&T has not yet decided if it will extend to T32 its Enhanced Diversity Routing Option, where circuits are routed over physically diverse paths.

©AT&T: (800) 248-3632.

HP

Continued from page 1

working on a work flow engine (*NW*, Aug. 23, page 1).

Apker said HP's product will differ from IBM's in a number of ways, the most obvious of which is that HP will rely more on relational database technology than will IBM, which is rolling out an object-oriented system.

Also, HP's system will run on multiple platforms from the start, whereas IBM's will initially run on just IBM hardware.

"We've evaluated object-oriented databases, and our conclusion at this time is that for production environments, they are just not bulletproof enough," Apker said.

"We'll be evaluating object technology as it develops," he said.

The software under development at HP is based on technology from an existing HP product called WorkManager.

This product, introduced last fall, is targeted at the manufacturing industry.

"The new engine will be more general. It will be designed for business process automation as well as ad hoc applications," Apker said.

HP will look to enhance the engine via distributed database technology, among other things, he added.

According to Dan Zimmerle, research and development manager for HP's Work Management Operation group, the work flow engine will reside on a server and will coordinate and monitor work flow processes.

HP will also offer server software providing clients with access to SQL databases for storage of documents and other information, and for storing work flow documents in a secure Unix directory.

A fourth server component will handle communications among servers in a work flow network. These software components can run on the same or separate servers.

Client software will handle graphical user interface (GUI) processing as well as other computational tasks designed to off-load work from the server.

HP will provide application development tools for describing work flow applications graphically.

HP will also provide programmatic interfaces so that users can use other vendors' GUI-based tools with the HP work flow engine.

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NetWare

Continued from page 1

products – add-ons that will help make NetWare enterprise-ready.

For example, the company last week brought out a comprehensive remote-connectivity product dubbed NetWare Connect. The software will give remote users complete access to NetWare resources and provide local and remote users with asynchronous wide-area connectivity.

Network management is another critical area, which is why the company next month at NetWorld '93 Dallas will map out plans for a rearchitected NetWare Management System that will provide such features as Simple Network Management Protocol support (*NW*, June 28, page 1). The internetworking product lines are also getting an overhaul as Novell is shoring up support for its new NetWare Link Services Protocol (NLSP), which lets users route NetWare traffic more efficiently.

"We're replacing our old routing with NLSP, and we're there popularizing that with other vendors right now," said Kanwal Rekhi, Novell's executive vice president and general manager of its Unix Systems Group. "We've made agreements with Wellfleet, Cisco and 3Com, and there'll be more."

Novell has already brought out another key piece of its enterprise puzzle in its NetWare Global Messaging product. The company is expected to bring out this week a new version of its Personal MHS product, to be renamed Remote MHS, that will let users in branch offices more easily communicate with others on the corporate net (*NW*, June 28, page 1).

"What's with AppsWare? I still don't understand it," The LAN Support Group's Pulaski said.

But as Novell's new structure suggests, these products are only a third of the picture.

Novell has dedicated an extraordinary amount of resources to UnixWare, a shrink-wrapped version of Unix that runs on machines based on Intel Corp. processors. But many do not understand why Novell is so intent on offering what seems to be a desktop operating system.

At Unix Expo in New York next week, Novell executives are expected to officially position UnixWare as the company's preferred application server operating system in an enterprise network.

"[NetWare Loadable Modules] have strength for a certain class of application, like databases or Lotus [Development Corp.'s] Notes," said Drew Major, chief scientist at Novell. "[But] if you're downsizing a COBOL application, you don't make it an NLM; you make it a Unix application."

To help better integrate UnixWare with NetWare, Novell will introduce a new version of UnixWare that will work within the NetWare 4.X environment, giving UnixWare users access to 4.X's directory, security, management and other enterprise services (*NW*, Aug. 23, page 1). Currently, UnixWare works only with NetWare 3.11.

The company is also expected to announce its intention to include NetWare hooks into the UnixWare kernel. The hooks would let users run a UnixWare application server on a NetWare local-area network with no additional connectivity, transport or gateway software, as is often required today.

APPWARE SYSTEMS GROUP

As they are with the Unix strategy, many are also confused about Novell's third major product, which is the one that ties many of the company's other products together: AppWare.

"What's with AppWare? I still don't understand it; nobody at Novell's explained the strategy," said Eric Pulaski, president of The LAN Support Group, a third-party NetWare developer in Houston.

Willie Tejada, director of developer relations at Novell's AppWare Systems Group in Austin, offered explanations.

AppWare is a development environment that third parties and power users can employ to build applications to access the services provided through NetWare, Tejada said. It consists of: The AppWare Foundation, Application Loadable Modules (ALM) and the AppWare Bus, and Visual AppBuilder.

The AppWare Foundation is a set of APIs that third-generation language developers can use to write programs that work with multiple network operating systems and on multiple operating system platforms. ALMs are software programming modules that developers can use and reuse to gain access to NetWare services, while the AppWare Bus ties all the ALMs together. Finally, Visual AppBuilder is Novell's own fifth-generation language-level programming tool that lets end users build their own applications.

"As we enhance NetWare beyond file and print, we'll be providing enabling services as opposed to actual applications," Tejada said. "That's why developers will need strong development tools. That's where AppWare fits in, to let developers build the applications to access NetWare services."

Will all these pieces seemingly in place, all Novell has to do now is convince the industry that they will all work together in a cohesive, enterprise environment.

But many observers say this new emphasis on products other than NetWare is causing confusion because Novell has failed to explain how each product fits into its overall strategy.

"Novell seems like a collection of disconnected policies," said Tom Nolle, president of CIMI Corp., a consulting firm in Voorhees, N.J. "They seem reluctant to embrace and articulate a strategy."

James Tolonen, Novell's chief financial officer, disagreed. "We're continuing the strategy we started three years ago - to broaden the product line and lead the market with a broader array of products," he said.

SPARCSERVERS

New Sun clustered file server speeds data access

BY CHRISTINE BURNS

Mountain View, Calif.

Sun Microsystems Computer Corp. (SMCC) next week will introduce a product that gives distributed network users transparent, reliable access to files stored on multiple Unix-based servers.

The SPARCcluster 1.0, to debut at Unix Expo, is a cluster of two or more SMCC SPARCserver 10 Model 40 file servers residing on different Ethernet local-area networks connected by an Ethernet switch. Each SPARCserver runs SPARCcluster 1.0 software, which makes the group of servers appear to users as a single system. Users can then access files stored on any SPARCserver 10 as if they were residing on a local server.

One problem companies have when they move files from a mainframe- or minicomputer-based network to a distributed LAN computing environment is ensuring users fast reliable access to data stored on various networked servers, said Steve Zocchi, manager of server technology at SMCC.

"The more dependent they get on distributed computing, the more they want that quick reliable access to data, and that's what we give them with this clustered file server technology," Zocchi said.

SPARCcluster 1.0 also enables users to replicate the same files on separate SPARCserver 10s for backup in case of a server failure. SPARCcluster 1.0 currently supports SunSoft, Inc.'s Network File System (NFS) Version 3, letting users in a multivendor environment access files on other NFS-compatible servers anywhere on the distributed net.

Cheena Sirnivasa, senior product manager for SPARCcluster 1.0, said support for Open Software Foundation, Inc.'s Distributed File Service, Novell, Inc.'s NetWare 4.0 directory services and Banyan Systems, Inc.'s StreetTalk III global directory services will be added in the future.

SPARCcluster 1.0, which will begin shipping this fall, ranges in price from $85,000 to $155,000, depending on the number of SPARCserver 10s included in the configuration.

✆SMCC: (415) 960-1300.

Dynasty

Continued from page 1

specification that is totally independent of any given target environment, you can define your application and determine where you want the pieces to run."

The company claims the product combines the ease of use of fourth-generation language development tools with the flexibility of object-oriented tools to generate standard C code that can run on multiple computing platforms linked by diverse networks. The software will be formally announced this fall.

Dynasty was founded by software industry veteran Michael Lyons, who also founded reverse-engineering firm Catalyst Corp. in late 1991. Dynasty's core technology, a set of rules-based code generation engines, is based on a product called Metagen from Trimarand, Inc. of Houston, which was acquired by Dynasty.

The rules engines drive the design, specification and generation of client/server applications, Skamser said. The design rules engine contains standard class libraries of objects and the rules needed to drive the application specification process. The developer specifies attributes of objects to be included in an application, and the design rules let the developer know whether just a few or hundreds of objects are needed to build any type of application.

Importantly, the software enables developers to specify where the pieces of an application should run and how they should communicate. Dynasty supports popular network facilities, such as Microsoft Corp.'s Dynamic Data Exchange and Netwise, Inc.'s remote procedure call (RPC) technology, as well as transaction processing monitors, such as Transarc Corp.'s Encina and Unix System Laboratories, Inc.'s Tuxedo. Dynasty will support the Open Software Foundation, Inc.'s Distributed Computing Environment RPC.

The objects are stored in the specification rules engine, which serves as a repository for data definitions, windows layouts, business logic and other application components. Groups of objects are then shipped off to the generation rules engine, which can generate application code for any target environment.

The software enables fast development by providing developers with hundreds of canned, but customizable, templates of basic application components.

The completed application runs fast because it is compiled in standard C code, which negates the need for a proprietary runtime component to interpret application process logic on each computer, said Paul Carpenter, vice president of marketing at Dynasty. Most fourth-generation languages on the other hand, require runtime software, which slows application response time.

The Dynasty software can be used to build applications that run on multiple platforms because its rules engines generate C code for numerous network, graphical user interface, hardware, operating system and databases environments, Carpenter said.

In the development environment, the Dynasty software will initially run on Intel Corp. 80486 or higher computers under Windows. The server component will run on any system supporting DOS files.

The Dynasty Development Environment costs $8,000 per developer workstation.

✆Dynasty: (713) 358-2764.

Da Vinci

Continued from page 8

NetWare Global MHS extends IPX/SPX to support messaging, eMail users can leverage existing NetWare LANs for E-mail transport.

GUI ADMINISTRATOR TOOLS

Among the most significant new features of Da Vinci's new E-mail product release are GUI-based E-mail administrator tools for adding and deleting users, among other things. The new menu-based, point and click administrative tools for DOS and Windows replace cryptic command-driven utilities in previous versions of eMail.

Randy Bryant, a diagnostic engineer with Hurco Manufacturing in Indianapolis, said the best thing about the new administrative capabilities is that he can add users to the E-mail system on the fly, a process that saves him time and pleases end users.

Bryant said he can add a user in one window while still running other administrative functions. Another new feature for automatically purging dated E-mail messages across the board is also useful, Bryant said.

New end-user enhancements to eMail 2.5 include shared mailboxes, which allow for simultaneous access to mailboxes by multiple users, and a multiuser bulletin board system.

Da Vinci eMail 2.5 is available now and costs $799 for a 10-user DOS and Windows starter kit. A DOS and Windows server upgrade kit is available for $129, while a DOS server upgrade kit costs $99.

✆Da Vinci: (919) 881-4320.

SynOptics

Continued from page 1

eventually offer ATM and token-ring switching capabilities, as well."

SynOptics will position the 5000 as a hub of hubs, switching traffic among departmental and work group LANs, thus ruling out the need for local routing or bridging capabilities (see graphic, page 1). This will put SynOptics squarely up against router and switch vendors whose products have been used to anchor these collapsed backbone architectures.

"The SynOptics move points to an emerging trend where inherent switching capabilities in hub platforms will obviate the requirement for routers as the main backbone device," said Fred McClimans, program director at Gartner Group, Inc., a consultancy in Stamford, Conn. He expects that trend to evolve over the next six to 12 months, with LAN-switched collapsed backbones becoming the norm and the hub vendors becoming the dominant players.

"The requirements for a router in the network will shift from the center of the net to more of the periphery in many cases, with the core of the network evolving into the high-speed switching arena," he said. "Once you want to enter a foreign environment, AKA the WAN, then the router becomes advantageous."

As indicated when SynOptics announced it was dropping plans to develop an integrated routing module for its new hub with Cisco Systems, Inc. (*NW,* April 12, page 1), the firm will recommend the use of a separate router for wide-area network access.

The SynOptics strategy is in direct contrast with that of 3Com Corp., whose High Performance Scalable Networking approach relies on the use of its NetBuilder II router to anchor collapsed backbones. While 3Com will use the NetBuilder combined with an ATM switch from Fore Systems, Inc. to create routed ATM environments, SynOptics will integrate its ATM switching capabilities into the 5000 to reach the same end with a single device.

Since SynOptics is on the verge of shipping the stand-alone ATM LattisSwitch it developed with help from Washington University in St. Louis (*NW,* Sept. 28, 1992, page 1), that integrated hub/ATM switch plan left some users scratching their heads.

"If they already have an ATM switch but are planning to integrate the ATM switching functionality into the 5000, how will they position both devices in the market?" asked Bryan Blanchard, data communications analyst at World Vision USA in Monrovia, Calif.

Blanchard, however, was supportive of the overall 5000 strategy, especially because SynOptics has taken pains to protect the users' investment in the LattisNet System 3000 installed base, SynOptics' current flagship hub.

"No one has to throw away their 3000s," he said. "You can still have them spread throughout your network and use the 5000 as the central hub in the collapsed backbone."

The 5000 will also address one of the biggest knocks against the 3000, which involves the way it handles network management. The 3000 required a network management card for every LAN that the hub supported, reducing the number of users and LAN segments it can support.

"The 5000 will feature an integrated distributed net management approach that will eliminate the need for all those management modules," said one source.

According to the sources, the 5000 is expected to ship by the end of the year. SynOptics declined to comment. ◆

NETWORK WORLD

161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Non-qualified subscribers: $5.00 a copy; U.S. — $95 a year; Canada — $117.70 (including 7% GST, GST #126659952); Central & South America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

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ISSN number: 0887-7661.

In a Nutshell

A **PRIMER** *on emerging technologies*

HSSI and HPPI open up data highways to high-speed traffic

BY BRYAN HASTINGS

Imagine zipping down the autobahn and suddenly having to jam on the brakes for a toll booth. Such is the case today when sending high-speed data between remote local-area networks or between mainframes. The toll booths in these cases are serial and parallel ports, respectively.

While LANs transmit data at 10M bit/sec and higher, serial port connections between data terminal equipment (DTE), such as a PC on a LAN, and data communications equipment (DCE), such as a router, crawl along at 4M bit/sec or less. Likewise, current parallel data ports on mainframes top out at 200M bit/sec, a fraction of the speed a modern mainframe serial channel can handle.

This situation is changing, however, thanks to two emerging standards: the High Speed Serial Interface (HSSI) and the High Performance Parallel Interface (HPPI), which define how vendors can build high-speed serial and parallel ports, respectively. HSSI ports are being built into traditional DTE and DCE, and operate at 52M bit/sec. HPPI ports are being built into mainframes and some higher performance peripherals, such as disk storage devices, and operate at 800M bit/sec or 1.6G bit/sec.

HSSI was codeveloped by Cisco Systems, Inc. and T3plus Networking, Inc. in 1989, and recently became a formal standard. It is designed to replace the 4M bit/sec RS-449 serial interface on routers, multiplexers, switches and other internetworking devices that transmit data to a data service unit/channel service unit (DSU/CSU), which provides the link to a wide-area circuit.

HSSI's speed allows 10M bit/sec Ethernet and 16M bit/sec token-ring networks to utilize the full 45M bit/sec of bandwidth offered by T-3 circuits.

HSSI achieves its high speed by using emitter-coupled logic (ECL) chips in transmitter and receiver circuitry. ECL chips are made of silicon and generate bipolar signals. The relatively small voltage difference between the bipolar signaling points — 0.8 volts, compared to the 6-volt or even 10-volt spread in earlier chips — allows for much faster signaling, while keeping switching noise within Federal Communications Commission limits for radio frequency interference (RFI).

For example, the 10KH series of ECL chips, which are popular for building HSSI adapter boards, operate at a few hundred megahertz, while the chips used to make RS-449 adapters top out at 10 MHz to 15 MHz. ECL chips are located either on HSSI adapters or right in the system board of a HSSI-enabled DTE. Improved shielding in the cabling and connector also allows faster speeds, while keeping RFI within acceptable limits.

A feature driving HSSI's market acceptance is its analogous design to RS-449, which is already familiar to hardware engineers. For example, HSSI and RS-449 use similar control signals and data clocking methods, have similar pin configurations and call for a maximum of 50 feet of interconnection cable between equipment.

IBM, 3Com Corp. and Computer Network Technology Corp. are among several dozen manufacturers that support, or plan to support, HSSI. Several router companies, including Cisco and Wellfleet Communications, Inc., make HSSI interface cards for their routers.

The biggest issues users should consider when upgrading to HSSI are the power of existing DTE, and the cost and availability of T-3 lines. The HSSI interface itself is typically a board upgrade, which costs as little as $8,000 and plugs into the DTE or DCE. In addition, users must buy a HSSI-equipped DSU. Entry-level HSSI-equipped T-3 DSUs start at $10,000. To maximize use of a T-3 line, users may want to combine voice, data and video traffic using a high-end, HSSI-equipped T-3 multiplexer, which typically costs from $50,000 to $100,000.

GETTING HIP TO HPPI

While HSSI allows LANs linked over a wide-area network to communicate at full LAN speeds, HPPI ties mainframes, supercomputers and other high-performance computers with ultrafast LAN-type connections.

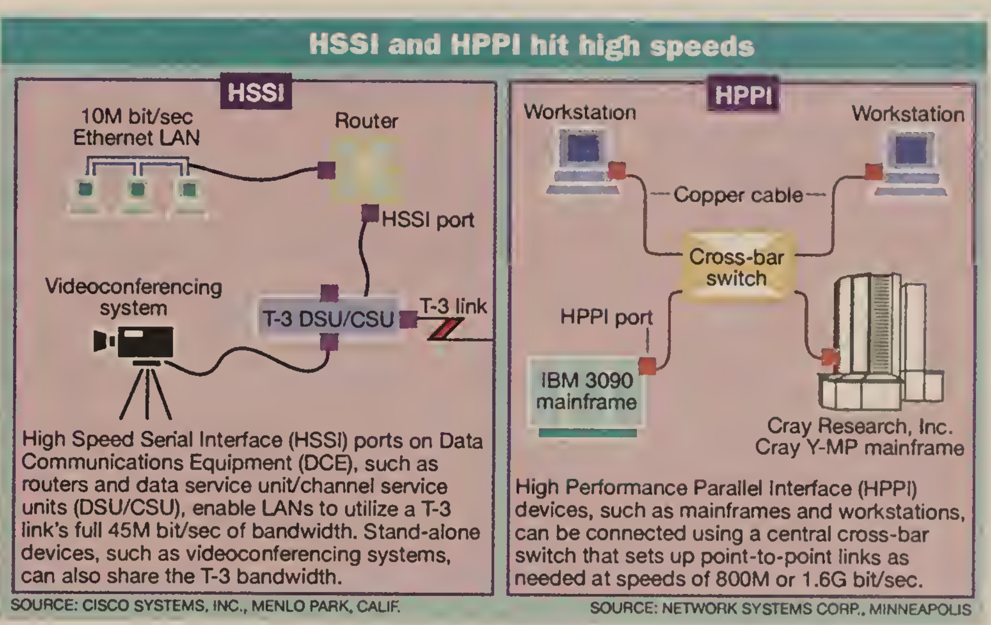
In the late 1980s, the Los Alamos National Laboratory in Los Alamos, N.M., began developing HPPI to interconnect mainframes at a central computing facility consisting of three buildings located about 500 feet apart. The scientists needed connections capable of supporting fast-motion, high-resolution video, with each frame displaying 1,280 pixels by 1,024 pixels at a color depth of 24 bits. The researchers found that a previous 50M bit/sec interconnection system, which supported 512 pixels by 512 pixels at a color depth of 8 bits, had become inadequate.

HPPI overcomes those limits. It defines an interface for point-to-point communications over distances of 25 meters or less, using simple request/connect signaling techniques.

Since deploying HPPI, Los Alamos researchers have gained much faster access to central file storage on their Ethernet network. The same gigabyte-sized file that took several hours to transmit through 10M bit/sec ports now takes five to six minutes through an HPPI connection.

Like HSSI, HPPI uses ECL chips. It doesn't employ any special signaling or clocking techniques, as long as the user stays within the 25-meter limit. HPPI utilizes twisted-pair cabling and provides a 32-bit or 64-bit parallel channel, with each bit position running at 25M bit/sec for an aggregate speed of 800M bit/sec or 1.6G bit/sec. Each bit position has its own twisted-pair cable. The 32 twisted pairs needed to operate at 800M bit/sec are bundled together into a 1/2-in. diameter flexible casing. To attain 1.6G bit/sec speed requires the use of 64 twisted pairs in two 1/2-in. flexible casings. The HPPI connector is an enlarged 100-pin version of the 50-pin SCSI-II connector.

HSSI and HPPI hit high speeds



High Speed Serial Interface (HSSI) ports on Data Communications Equipment (DCE), such as routers and data service unit/channel service units (DSU/CSU), enable LANs to utilize a T-3 link's full 45M bit/sec of bandwidth. Stand-alone devices, such as videoconferencing systems, can also share the T-3 bandwidth.

SOURCE: CISCO SYSTEMS, INC., MENLO PARK, CALIF.

High Performance Parallel Interface (HPPI) devices, such as mainframes and workstations, can be connected using a central cross-bar switch that sets up point-to-point links as needed at speeds of 800M or 1.6G bit/sec.

SOURCE: NETWORK SYSTEMS CORP., MINNEAPOLIS

HPPI is coming just in time since most mainframe makers are improving their channel speeds. Until recently, most mainframes sported a serial port or either an 8-bit or 16-bit parallel port that handled data from 25M to 200M bit/sec. Now, a growing number of computers and peripherals can handle the high speeds HPPI permits. For example, most Cray Research, Inc. computers and Silicon Graphics, Inc. Challenge workstations can make full use of HPPI.

There are two ways to connect devices using HPPI. One is to use a single dedicated line between two devices, which is an inflexible solution because it limits communications to point-to-point.

The more popular method is to connect multiple HPPI devices using a cross-bar switch, a throwback to the early days of telecommunications. Each computer and peripheral is connected to a central switch that establishes point-to-point links on an as-needed basis.

Until the end of last year, only HPPI's physical layer — the part that defines signal levels, connectors and the like — had been formally standardized. Before then, HPPI was best used to send raw data lacking any form of error correction, as opposed to sending protocol-encapsulated data.

The HPPI Framing Protocol (FP), the data link layer portion of the specification, became an official ANSI standard at the end of 1992. HPPI-FP paves the way for running multiple protocols over HPPI connections. HPPI Link Encapsulation (LE), the network layer of the specification, is close to standardization and will allow HPPI to support standard networking protocols such as the Transmission Control Protocol/Internet Protocol and User Datagram Protocol (UDP). HPPI-LE promises to enable users to link mainframes into a shared network facility.

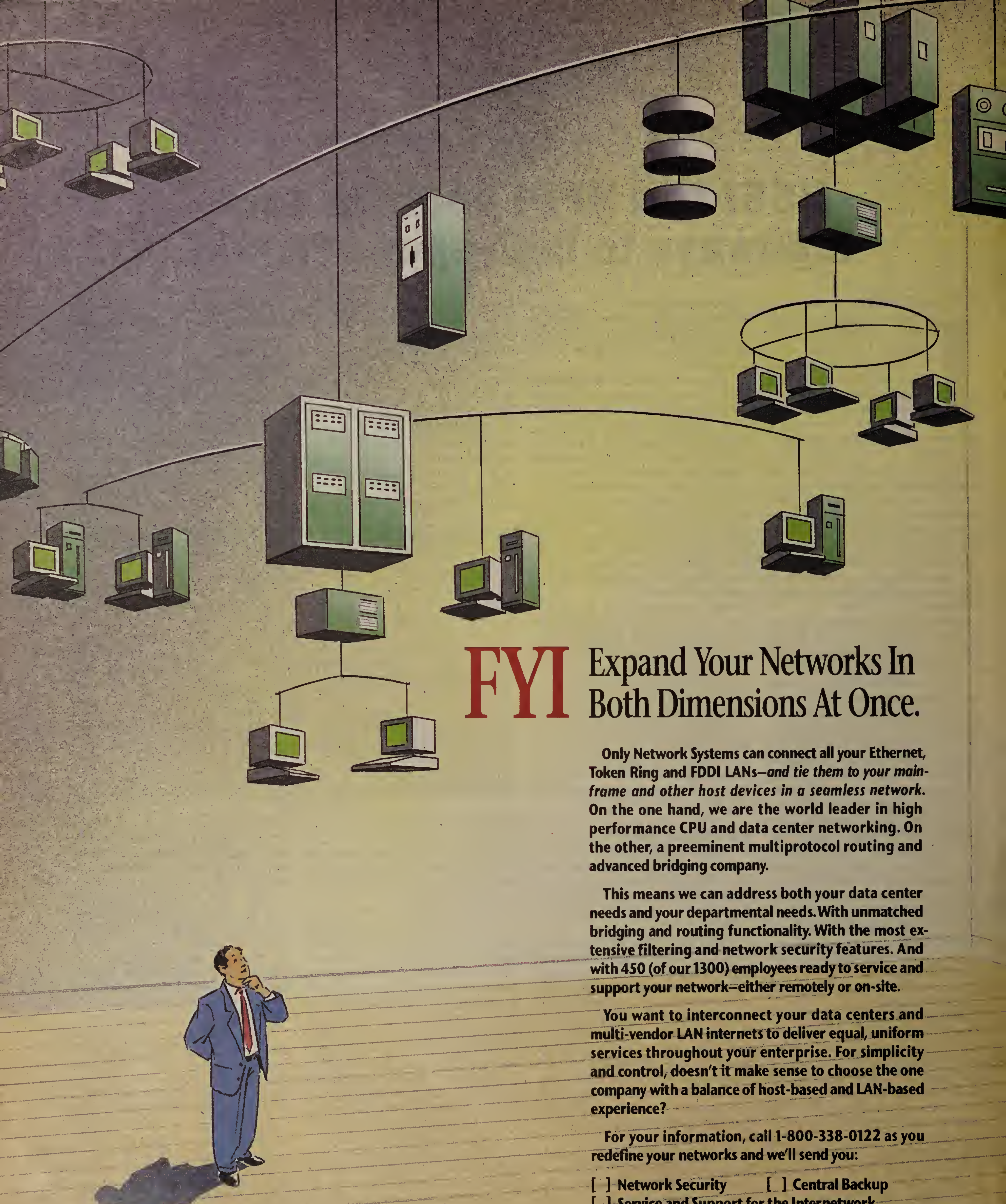
IBM, Cray Research and Thinking Machines Corp. are a few of the computer companies that include HPPI connections on their mainframes.

The fastest mainframe parallel port before HPPI was Cray's HSX channel, which runs at 800M bit/sec. However, Cray never published HSX specifications, so HPPI was developed as a variant of HSX.

HPPI offers a more streamlined flow control than HSX. HPPI uses a preacknowledgement system in which the receiver sends data transmission credits to the sender. Each credit tells the sender how much more data the receiver can accept. In contrast, HSX uses the more traditional system of sending an acknowledgement burst to the sender after each data burst.

Just as the speed limit on the autobahn is determined by what is under a car's hood, HSSI and HPPI ensure a wide open data road for the most powerful network engines.

➾ Hastings is an associate editor with *PC World* in San Francisco.



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